

# The Iron Age

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## A New Form of Regenerative Furnace.\*

I have pleasure in bringing to your notice a new form of regenerative furnace, in which considerable departures are made from the usual practice of furnace-building. The furnace—which is the joint invention of Mr. James Riley and myself—presents several novel features, and in its design we have aimed at decreasing the cost of construction and maintenance, and at the same time retaining, and even adding to, the good points of the ordinary Siemens furnace. The new furnace does not in any way differ in principle from the Siemens furnace, but only in construction and arrangement of the various parts. Thus in the model before you—which is that of a 12-ton smelting furnace—there is the melting chamber or furnace proper, and four regenerative chambers, two for gas and two for air. But instead of the furnace and regenerators forming parts of one structure of brickwork, they are separate from each other, and are contained in circular casings of wrought iron or steel plates riveted together; and not only are the regenerators separate from the furnace, but they are separate one from the other, as shown by the model and the diagrams. From these it will be seen that the arrangement consists of a circular furnace body, placed on a platform supported by girders, while the regenerative chambers are placed in pairs at each end of the furnace. The furnace is thus left entirely clear underneath, a condition of things which insures the bottom being kept cool, and lessens the likelihood of the charge breaking through. The regenerators, not being underneath the furnace, are out of harm's way in the event of a break out; and, further, it will be observed that the regenerators have nothing but their own weight to carry, and can never get out of shape. The furnace is not supported in any way by the regenerators, and this is a feature in the design which must commend itself, for a worse support than a mass of white-hot brickwork on which to carry the weight of a furnace and its load of metal can scarcely be conceived.

With the exception of using dampers to separately control the passage of the products of combustion through the gas and air chambers, no change has been made in the flue and valve arrangements. It is very necessary to be able to regulate the relative amounts of the heated gases passing through the regenerators, because it is thereby possible to regulate the relative amounts of heat stored up in the different chambers. Without this separate control the tendency is for the gas regenerator to get more than its share of the waste heat, whereas it is more necessary that the air regenerator should be the more highly heated.

Before describing the furnace in detail it may be of interest to show how it originated, the more especially as the steps are instructive. The design is really the outcome of experiments instituted by Mr. Riley in 1880 at the Newton Works of the Steel Company of Scotland, Limited, to determine the fitness of the basic lining for use in the Siemens furnace. The difficulties then encountered gave rise to various changes in design, which eventually culminated in the form now before you. A 14-ton furnace of the usual type was used for the trials. The first trouble encountered arose from the excessive quantity of slag. This difficulty Mr. Riley successfully met by placing a slag-spout at a higher level than the tap-hole. The bottom of such a large furnace proved troublesome and expensive to keep in repair, more especially as the basic mixture had not at that time been positively determined. For this reason it was resolved to build a smaller furnace for experimental purposes. I therefore designed a 2-ton furnace for use in this work. It was of the common class, and, with the exception of the slag-spout, contained nothing new in the design. At this time considerable difficulty was experienced from the fluxing of the lining of the furnace

at the junction of the acid and basic material.

In the 2-ton furnace this difficulty was not sufficiently met. The design was, therefore, abandoned, and I designed (under Mr. Riley's direction) another 2-ton furnace having a movable bottom resting on a carriage, in order that repairs might be more quickly and easily executed, and that the separation of the acid and basic linings might be more complete. On estimating the cost of this last furnace, we found, to our mutual astonishment, that it was actually less than that of the first 2-ton furnace, notwithstanding the increased complication.

In the case of an ordinary Siemens furnace. Although we had thus to some extent simplified furnace construction, the part which the casing and binding of furnaces played in the first cost had been so forcibly brought under our notice, and so much trouble had been experienced by furnaces going out of shape, that we resolved to push the search for improvement further. The circular form was at once looked to as a means of attaining sameness of form in all the buckstaves and bottom plates, and of dispensing with tie-rods and binders. We were the most inclined to favor this shape from its extreme suitability for the reception of a basic lining.

side-thrust, and also that these parts might be lifted bodily and removed for repair, and for giving access to the checker-work. The flues were also reduced to mere iron shells lined a single brick thick. The regenerators were placed in pairs, gas and air together, at the ends of the furnace, and close to it. Small blocks were employed for the introduction of the gas and air to the furnace, built as shown in Fig. 8. These were used in order that the roof might be above all, and easily removable, so as to facilitate the charging of large pieces, and of pig iron and scrap in bulk. In passing, it should be mentioned that the roof and covers rest loosely

rolls and large pieces of metal. The pieces, up to 8 tons weight, are lifted by a crane and charged through the roof. A 3 to 4 ton piece takes about two hours to melt. A considerable saving is effected. It was our former practice to break these rolls by blasting with dynamite, at a cost of 12s. 6d. per ton. The resulting pieces, from their size, were only worth 30s. per ton. The rolls are now being melted at a total cost of 6s. 8d. per ton for fuel, labor and fixed charges, and are run into a marketable pig of superior quality.

This furnace has been quite successful in its working from the beginning, none of the hitches usually looked for in new things having occurred. Some useful experience and a good deal of confidence have been derived from its working; so much so, that we are now proceeding with a 12-ton furnace, of which Figs. 4, 5, 6 and 7 show the design. It was at first thought that, as the flame does not travel along the roof, it would be possible to use common fire-bricks for the crown. These bricks began to run in a short time, and had to be replaced by silica bricks. Shortly after the furnace started work, one of the gas regenerators got choked, owing to a careless furnaceman neglecting to reverse. The cover was lifted, a few of the top courses of bricks raked out, fresh ones put in and the furnace started within three hours, and without being appreciably cooled. In emptying and renewing an ordinary Siemens chamber—and it usually must be completely emptied, no half measures being possible—the quickest time on record that I know of is 24 hours, and that is a remarkable feat.\* The saving of time in repairs is thus not one of the least advantages in this type of furnace. There is likely also to be less occasion for repair than usual. The furnace has been at work for too short a period to enable us to give this assertion all the weight we could wish. It can only be said that after five months' work the furnace is practically as good as new. The furnace is lined with 14 inches of silica bricks, and the regenerators with 9 inches of fire-brick work. The radiation is very slight indeed. The hand can be held within  $\frac{1}{4}$  inch of the iron casing without discomfort.

Figs. 4, 5, 6 and 7 show the design of the 12-ton furnace to be erected at our Blochairn Works. The body has a 14-inch silica-brick wall built in an outer shell of  $\frac{1}{2}$ -inch steel plates. The internal diameter is 11 feet 6 inches. The roof is of silica bricks 9 inches thick, is dome-shaped, and is bound by a T-iron ring, so that there is no thrust on the furnace walls, and the roof may be lifted off or on in one piece. There being no blocks in the furnace, and no thick places in the walls, it is equally cool all round. The bottom rests on the common flooring plates, and the air has perfectly free access to these plates.

The gas regenerators and the air regenerators are 6 feet 6 inches internal diameter, are lined with 9-inch fire-brick work, and have outside casings of  $\frac{1}{2}$ -inch steel plates. They stand loosely on the floor, carry only their own weight, and are only connected to the furnace by the Batho tubes. They are provided with doors at different levels for convenience in filling or emptying the checker-work, and have sight holes well above the floor level, by which the condition of the interior may be observed while the furnace is at work. At their bottom parts they are connected by iron-plated flues lined  $3\frac{1}{2}$  inches thick with fire-bricks to the usual reversing and air and gas-valve arrangement. The two dampers already referred to are shown, one controlling the gas chambers and the other the air chambers. It will be observed that from the position of the floor line very little excavation is required.

Figs. 1, 2 and 3 show a heating furnace on the same principle. It is intended for use in our guide mill. The furnace bed is 12 x 6 feet. Doors are provided on both sides, so

\*It usually takes about a week to change the checker-work in a Siemens furnace.

(Continued on page 5.)

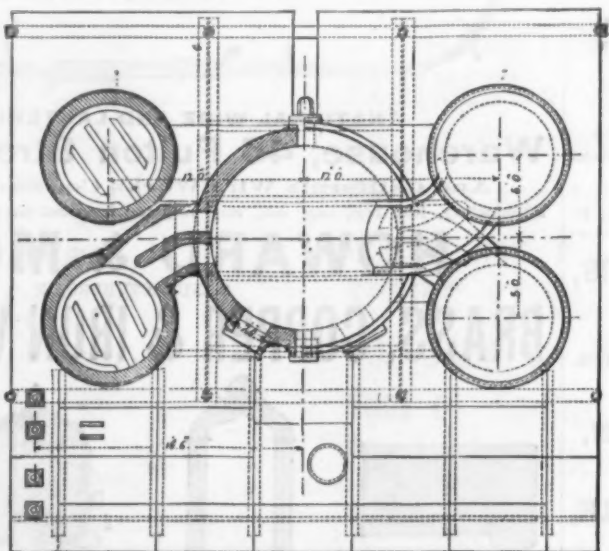


Fig. 6.—Horizontal Section and Plan of Regenerative Furnace.

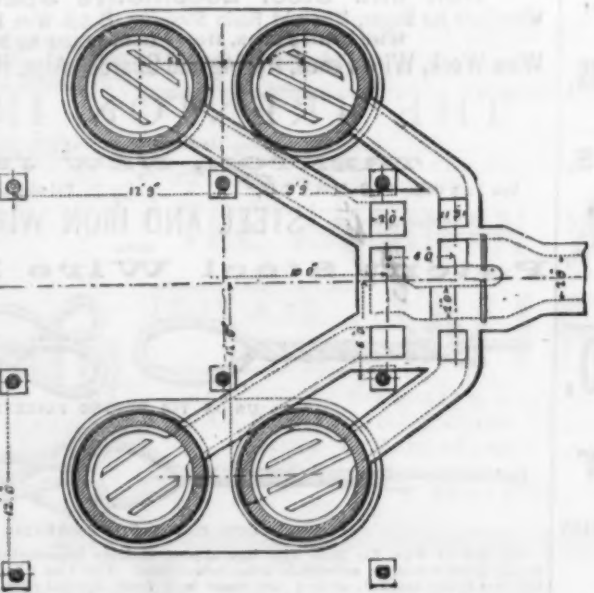


Fig. 7.—Horizontal Section of Regenerative Furnace.

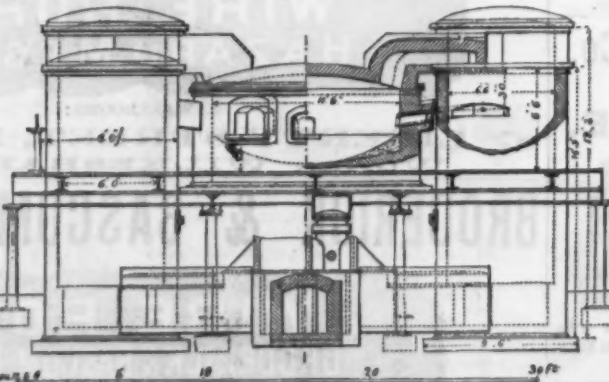


Fig. 4.—Section and Elevation of Regenerative Furnace.

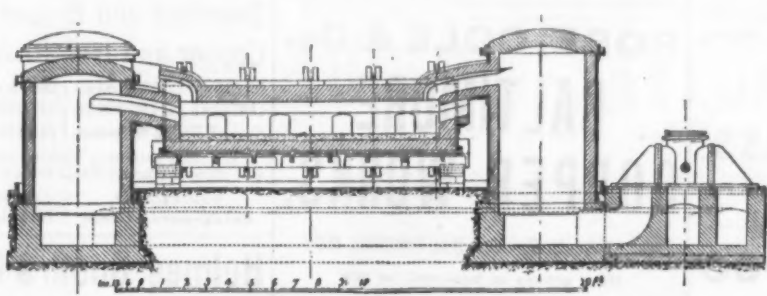


Fig. 1.—Longitudinal Section of Heating Furnace.

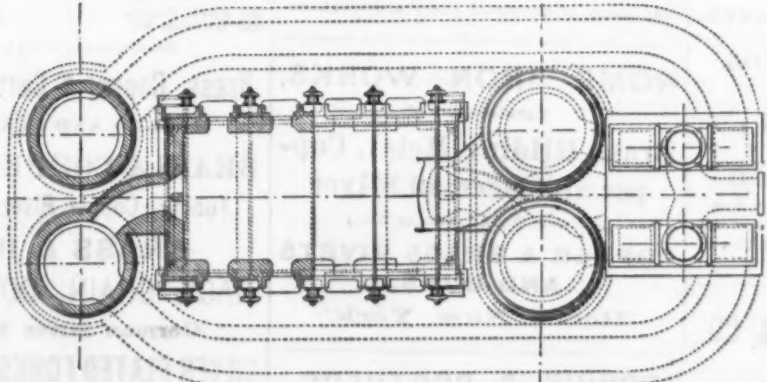


Fig. 2.—Sectional Plan of Heating Furnace.

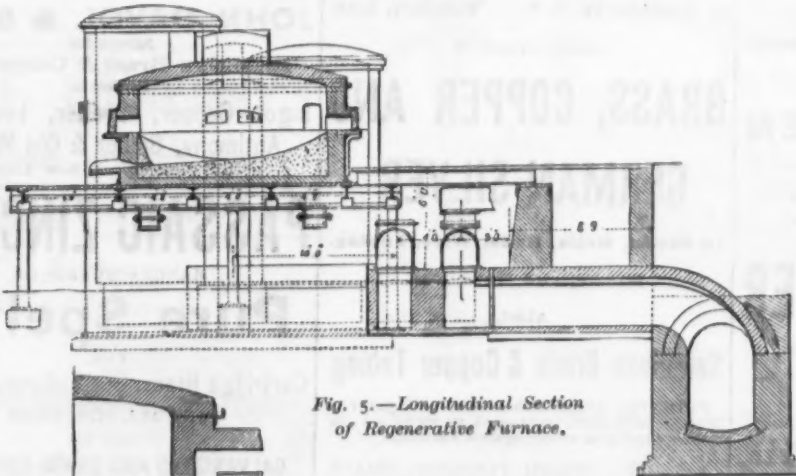


Fig. 5.—Longitudinal Section of Regenerative Furnace.

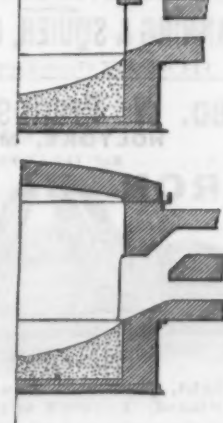


Fig. 8.—Blocks for the Introduction of Gas and Air.

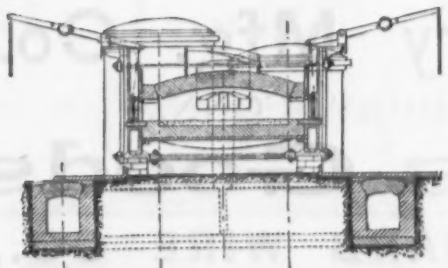


Fig. 3.—Cross-Section of Heating Furnace.

A NEW FORM OF REGENERATIVE FURNACE, INVENTED BY MESSRS. DICK AND RILEY, GLASGOW, SCOTLAND.

An analysis of the costs showed that this was due to the disposition and the difference of amount of the cast-iron work in the two designs. This led us to originate the design of the body of the "Batho" furnace, as it is erected at our Newton Works. In this furnace horizontal cast-iron girders, of the whole length of the body, are placed along the lines of pressure—i.e., along the sides of the bath at the level of the metal, and along the springing of the straight roof. These girders are held apart by light cast-iron uprights. The whole furnace is self-contained, and sits in a frame of malleable-iron beams, and is well clear of the floor. The cast-iron work was designed in such a way that one pattern did for all the girders, and one for all the uprights. This was a notable departure from the usual conglomeration of differently-shaped buckstaves, binders, tie-rods, &c., which go to make up

The circular form once adopted, the transition from the heavy, expensive and easily-cracked cast-iron casing to the shell of riveted wrought-iron or steel plates was an easy and natural step. The next thing was to support the furnace body independently of the regenerators. Being now freed from conventional notions in furnace design, it was at once recognized that more than equal advantages would be obtained by treating the regenerator chambers in the same way as the body, and inclosing them also in circular iron casings. The bricks, therefore, came to be used simply as non-conducting linings, and were not required to support the weight of any part of the structure, the quantity required being thus reduced to a minimum. Other refinements followed, such as the building of the roof of the furnace and the covers of the chambers in iron rings, in order that the walls might be relieved of

on sand joints on the tops of the side walls. Owing to the difficulty experienced in handling so heavy a piece as the main roof, it was found advisable simply to pierce it with a central charging hole and use a supplementary roof or cover. This arrangement left us free to adopt the one thing required to make the furnace perfect—namely, the Batho connecting tubes. These, it will be observed, are shown in Figs. 1 and 2, and our experience of them has been so favorable that we intend to use them in all furnaces of this class. An experimental furnace of 4 tons capacity was erected at our Blochairn Works five months ago and has been in constant work ever since. For the last four months steel of soft quality has been produced by it,  $3\frac{1}{2}$ -ton charges being got out under eight hours by the Siemens pig-and-ore process. For the last month the furnace has been used for melting up broken

have sight holes well above the floor level, by which the condition of the interior may be observed while the furnace is at work. At their bottom parts they are connected by iron-plated flues lined  $3\frac{1}{2}$  inches thick with fire-bricks to the usual reversing and air and gas-valve arrangement. The two dampers already referred to are shown, one controlling the gas chambers and the other the air chambers. It will be observed that from the position of the floor line very little excavation is required.

Figs. 1, 2 and 3 show a heating furnace on the same principle. It is intended for use in our guide mill. The furnace bed is 12 x 6 feet. Doors are provided on both sides, so

\*It usually takes about a week to change the checker-work in a Siemens furnace.

(Continued on page 5.)

\*Paper read by Mr. F. W. Dick, Glasgow, at the Chester Meeting of the British Iron and Steel Institute.



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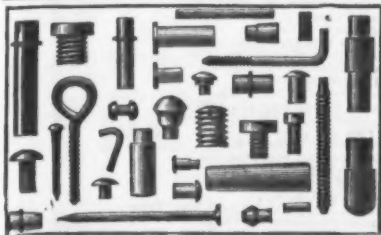
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Specially adapted to Soft Foundry or Highest  
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LIGHT CASTINGS A SPECIALTY.  
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Chains for Foundry Cranes and Slings.  
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Steel, Universal and Sheared Plates, Angles and  
Shapes.  
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Sole Agent for  
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Lynchburg, Millcreek and Mt.  
Laurel  
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CHARCOAL PIG IRON.**  
430 Walnut St., PHILADELPHIA, PA.

(Continued from page 1.)

that billets may be charged on one side and  
drawn at the other. The body is carried by  
two iron girders, which rest on brick piers  
at the ends, leaving a free space under the  
furnace, so that rods from the mill may be  
run under it if necessary. It would be pos-  
sible to move this furnace from one position  
to another without pulling it down. It may  
interest some of you to know that furnaces  
on this plan are likely to come into use for  
foundry purposes and for glass-making. The  
circular body is peculiarly adapted for glass-  
making purposes, where several men have to  
work around one furnace.

The advantages of the system are briefly  
these: From the independence of the parts,  
from the fact that the brickwork has not to be  
made to support heavy weights, and from  
the simplified casings possible with the cir-  
cular form, the amount of material required  
in the construction, the labor in erecting,  
and, as a consequence, the first cost, is re-  
duced to a minimum. The cost of melting  
furnaces on this plan is less than three  
fourths of the cost of the common type of  
furnace of equal capacity. The repairs and  
up keep are slight. That this is not alto-  
gether a matter of belief is shown by the con-  
dition of the 4-ton furnace after five months  
work, and by the case I have instanced of a  
speedy repair of a choked regenerator. In  
this connection it should be pointed out that  
a spare surface cover may be kept; or, if  
this is not considered desirable, then, in the  
event of the roof falling in, the binding ring  
may be lifted off and placed on the floor, a new  
roof built in it, and the whole lifted bodily  
into place in the course of four or five hours,  
without specially cooling the furnace. When  
a roof collapses in a Siemens furnace the  
structure has to be cooled down and centering  
put in on which to rebuild the roof. The  
roof of the new furnace is not, however,  
much affected, as it is removed from the  
cutting action of the flame.

From a consideration of the form of the  
parts, and the manner of casing, it will be  
admitted that the furnace is not likely to  
give trouble by getting out of shape. The  
lining of the furnace cannot readily drop in,  
as it is "arched" all round. It will be no-  
ticed from the plan that what are practically  
idle corners in a rectangular furnace are  
filled up. No partial vacuum can be formed  
there by the entering gases; eddies are pre-  
vented, and the flame pursues an even course  
across the furnace, instead of clinging to the  
walls. Further, the furnace walls recede  
just where the flame is most expanded. For  
these reasons the lining is much less liable to  
cut than in the rectangular furnace. This  
statement is borne out by our experience.  
The whole surface is so open to the air that  
a break-out is not likely to occur; but, should  
it happen, very little harm can be done,  
since there is nothing under the furnace to  
come to grief. As the regenerators are  
quite separated from each other, and as the  
gas and air tubes are also apart, there can  
be no leakage from one to the other, and,  
therefore, no combustion can take place ex-  
cept in the furnace. This is a very impor-  
tant point and rids us of a very pregnant  
source of trouble in the shape of undue wear  
and tear caused by gases burning in the  
ports and chambers. Being cased in tight-  
iron coverings, no cold air can be drawn  
into the regenerators or flues. Leakage in  
this direction frequently gives rise to much  
loss of heat.

When the regenerators become choked,  
the covers may be lifted and the chambers  
examined separately before commencing  
operations. Any one chamber, or the fur-  
nace itself, may be cut out of the system,  
cooled down and repaired, without cooling  
or in any way disturbing the other parts.  
The saving of time in effecting repairs is  
very great. The removal of a few of the  
top courses of checker bricks will generally  
be found to put the regenerators in order.  
Compare this with the usual necessity of  
waiting till the whole mass of a furnace  
cools, and taking out the whole of the  
checker-work to get at those bricks on the  
top. It seems to me almost superfluous to  
point out the peculiar adaptability of this  
furnace for the basic process. It is not even  
necessary to use basic bricks, since the cir-  
cular body can be rammed with the same  
ease as a Bessemer converter. The easy  
and complete severance which can be made  
between the basic and acid lining renders  
the production of basic steel in the open-  
hearth furnace both possible and feasible.  
It is the intention of the Steel Company  
shortly to resume experiments in basic work-  
ing, and, with the new furnace, success is  
confidently anticipated.

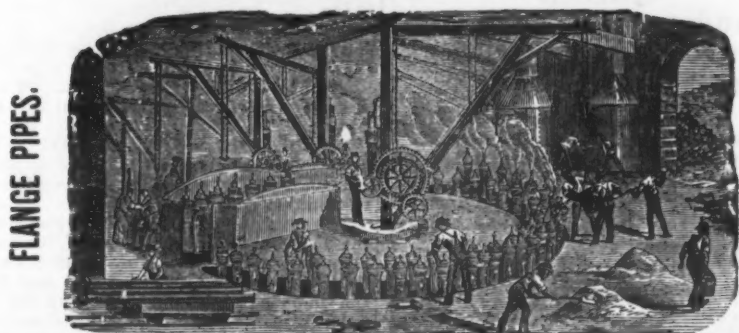
**Water Balances for Hoisting Coal.**  
It is stated that in many of the works of  
the great coal basin of South Wales water-  
balance machines are largely used for mines  
not more than 100 fathoms deep. In a dis-  
trict where there is plenty of water and free  
drainage, they work well. The car is placed  
in a cage over an empty water bucket, and  
the empty car on a similar bucket at the  
top; water is then made to flow into the  
upper bucket until its weight is great enough  
to cause it to descend, thus raising the  
loaded car, and, on the arrival of the full  
bucket at the bottom, a self-acting valve  
opens and the water is discharged, so allow-  
ing the process to be repeated. The buckets  
are made of 1/2-inch boiler plates, circular  
in form, and holding about 2 tons of water;  
the landing chain is balanced by a chain  
which hangs below each bucket, and guide  
chains are used to keep the buckets from  
striking each other when the shafts are not  
divided. A speed of 300 or 400 feet per  
minute is easily attained by this means, but  
for great depths the weight of the machinery  
renders the apparatus no longer economical.

Searching the history of China for evi-  
dences of a stone age, Mr. Joseph Edkins finds  
that as far back as B. C. 2205, in the time of  
Yu, all the common metals are mentioned in  
a list of tribute offered the Emperor. Fifty  
years before the Emperor Shun had buried  
gold to make the people less covetous. A  
stone hatchet has lately been found near  
Kalgan in a mound 40 feet high. The mound  
and others in its neighborhood are said to  
resemble those of Ohio, and the hatchet is  
not to be distinguished from those of the  
"mound builders" in Ohio museums.



# A. H. McNEAL,

BURLINGTON, N. J.



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Warranted Equal to any Produced.

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For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear  
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For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

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For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws,  
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SIEMENS OPEN HEARTH STEEL CASTINGS FOR  
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STEEL WASHERS  
OF ALL SIZES.  
AT SAME PRICES AS IRON WASHERS.

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Open Hearth and Crucible  
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QUALITY EQUAL TO STEEL FORGINGS.  
Can be Bent, Welded or Forged.  
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We wish to give special attention to making Cast Steel Rolls of all sizes, Mill  
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Being desirous of securing a share of public patronage, we will endeavor to make our  
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This is the only steam boiler ever devised in strict  
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the bottom plates, affords safety with high pressure,  
and secures great economy. The invention is applic-  
able to every style of boiler, and can be readily ap-  
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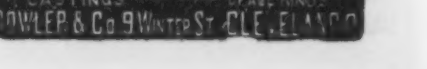
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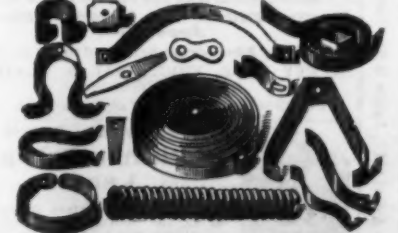
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Manufacturers of

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THREE  
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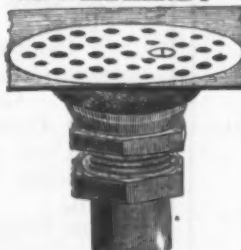
FIG. 120.



FIG. 209.



FIG. 70.

**Wrought Steel Sinks.**

One of the strong points of these sinks is the new coupling with which they are now supplied and which is pronounced by all plumbers the best on the market. It is used with both lead and wrought-iron pipe; is a neat, reliable coupling, and is easily detached for the purpose of pumping out the pipe. The strainer and all parts of the coupling are tinned, and are furnished with all sinks without extra charge.

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Patent Rubber Buckets,

Wooden Well Curbs, Wood Tubing,

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Patent Copper Pumps,

Hydraulic Rams, Power Pumps,

&amp;c., &amp;c., &amp;c.



FIG. 114 REPRESENTS OUR

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**IRON AND STEEL DROP FORGINGS**

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**SEAMLESS DRAWN BRASS & COPPER TUBES.****CUT NAILS, HORSE NAILS, FORGINGS, &c.****NAHUM STETSON Jr., Agent, 73 Pearl Street, New York.****Methods of Obtaining Caspian Crude Oil.**

Of all the oil springs in the Caucasus the greatest quantity of petroleum has always been obtained from the plateau about 8 miles to the north of Baku, upon which the village of Balakhany is situated. From time immemorial wells have been dug there, and the thick, viscid, greenish-brown liquid which oozed from the soil has been put into goatskins (called vordooks), and carried on the backs of camels to the villages in the interior. The strings of camels bearing these primitive bottles may be seen at the present day winding their way over the desert tracks, on their journey to the towns and villages of Daghestan. Afterward came the era of barrels. No wood grows along the arid shores of the Caspian; and the steppes of Southern Russia, however generous the soil may be, are now deprived of all the forests which once existed there. Barrels of wood had, therefore, to be brought from the Volga and the Kama, and from the smaller tributaries which flow through the dense forests in the north, and this, of course, was expensive. The barrels filled with crude petroleum were carried down to the port of Baku in arbas, to be shipped to Persia and other places along the Caspian shore. From the time of Marco Polo this trade has been carried on, and no doubt in entirely the same manner. The arbas are the strangest of vehicles drawn by horses. Two enormous wheels, generally about 7 feet in diameter, are fastened to an axle which rotates with them. Above the shafts is a small wooden framework in which part of the load is carried, while hanging below the shafts is the other part. A stalwart Tartar, with huge sheepskin cap, is generally perched on the top, and the arba, into the construction of which no iron enters, groans as it slowly moves toward the town.

At present the operations of the petroleum industry are conducted thus: Wells are sunk on the plateau of Balakhany, from whence almost the whole of the oil is now obtained. The area now being worked for oil is only about 3 or 4 square miles. This is known to be but a small fraction of the total area of the petroleum field, yet the quantity of oil obtained is so very great that no inducement exists for risking the expense of boring in less favorably situated places. There are about 400 wells in the area referred to, and this number is being constantly increased. The wells vary in depth considerably. Before boring was introduced they were from 30 to 150 feet deep, but now they go down as much as 700 feet. The boring system used is a modification of the American; sometimes ropes are used and sometimes thick iron drilling rods. A heavy lever driven by a steam engine strikes the blows which force the chisel through the soil. All the wells are cased with tubing. The first series is made of wrought iron, is generally 15 inches in diameter, and goes down to a depth often of about 40 or 50 fathoms. When this pipe ceases to run down (each section of about 7 feet being riveted to the preceding), another series, 12½ inches in diameter, is introduced. When this in turn comes to a stop, another series, 10½ inches in diameter, is introduced. The last series of these concentric tubes is 8 inches in diameter. Being made of thick "drawn wrought iron," force can be used if it should show signs of refusing to sink with the deepening of the bore.

The strata are so very irregular that it is impossible to predict the depth at which the oil will be found. The wells a few years ago were about 300 feet in depth. Afterward 500 feet became the average. To-day the richest wells are those which are 600 feet in depth. A few of these wells have given quantities of oil so great as to seem fabulous. One of the most famous is that of the Drojba Company, the loss of oil from which raised much indignation in Russia. It belongs to an Armenian company, which was almost ruined through the claims brought against it on account of the damage done to the neighboring property by the overflow of oil. It is now surrounded by a huge bank of sand, which was thrown up with the oil. So great was the quantity of sand that a house close to the well was quite buried. This fountain commenced to spout on August 18, and it continued until December 14. At first it gave 50,000 barrels in the 24 hours. This became gradually reduced to 25,000, then to 10,000 and to 8000, when at last it stopped. Two other wells belonging to Mr. Nobel—Nos. 9 and 25—gave almost similar quantities. While referring to the latter, an interesting fact may be mentioned. This well still gives off gas at a very great pressure—a gauge has shown more than 200 pounds to the square inch—which has been used for drilling other wells, instead of steam. The gas is simply led into the boilers, and the pressure regulated by a stop-cock to 55 pounds, and one can see the strange phenomenon of a steam engine working with no fires beneath the boilers, everything being perfectly cold. Stones have been thrown to a height of 900 feet by the pressure of the gas. Of course it was found that, with such large quantities of oil gushing forth on the mere sinking of a well, the vordooks and arbas were insufficient for the transports. Mr. Nobel accordingly laid a line of iron pipes, but this provoked the liveliest opposition from the Tartars and others who were engaged in the transport. So great, indeed, was their anger that they threatened to destroy the pipe. Armed watchmen were accordingly placed in little stone houses—detached forts, in fact—to guard the structure upon which depended the feeble life of the new-born industry. In time, however, other capitalists followed the example of Mr. Nobel, and now there are about half a dozen pipes, of which the two largest belong to the gentleman who has been so often mentioned. The Tartars found other employment as the industry became developed, and now these watch-houses are going to ruin. Thus an uninterrupted supply of oil was now guaranteed at Baku, where the refineries are situated and whence the refined oil can be shipped to its destination.

**Early Steel Sword Found in a Swiss Lake.**—The gem of Dr. Goss's collection, says the *Contemporary Review*, is a steel sword found at Corcellette. The fact that it is steel has been proved by an analysis,

and the specimen is unique among Lacustrine finds. The blade, which has suffered somewhat by fire, is 25.58 inches long, straight and pointed, and the waved lines with which it is embellished are evidently the work of some prehistoric engraver. Who were the forgers of this weapon is a question which Dr. Goss discusses at some length, and, having regard to the undoubted skill of the Lacustrians as metal-workers and to other circumstances, he leans decidedly to the opinion that it was wrought by themselves; yet, seeing that no other arm of the same material has been found elsewhere, the correctness of this conclusion is perhaps open to doubt. Among other objects brought to light by the labors of Dr. Goss are bronze daggers, highly-ornamented hatchets, chisels, gouges, knives, hammers, anvils, needles, tools for net-making, fishing tackle, buttons, chains, spoons, spear-heads, arrow-points, and rings, bracelets and other ornaments in great variety. Strange to say, saws, though they seem to have abounded in the stone age, are rarely found among the vestiges of the age of bronze. The total finds of them in the Swiss lakes do not exceed half a dozen, of which two are in the collection of Dr. Goss. One was found at Moerigen, the other at Auvernier, and both appear to have been used as frame saws.

**A Difficult Task Accomplished.**

A San Francisco exchange says that the Lick trustees, San Francisco, have just received very important advices from Paris in regard to the glass disk which is needed to complete the 36-inch equatorial for the Lick Observatory. The contract for two disks—one of flint and the other of crown glass—which are needed for the construction of an achromatic objective was let to the celebrated firm of Alvin Clark & Sons in 1861. There were only two firms in the world who were capable of making glass disks of such size—nearly 40 inches in diameter. The Clarks employed one of these, Messrs E. Feil & Co. of Paris, to cast the rough disks for them. The flint disk was cast in an unexpectedly short time, but the making of the crown disk has proved to be a matter of great difficulty, and this alone will have delayed the making of the large objective, and thus the completion of the Lick Observatory, by several years. The Lick trustees will have all the observatory, excepting the large telescope and the dome to contain it, finished and ready for work during 1885. As soon as two perfect disks of crown and flint glass are on hand the focal length of the telescope can be calculated and the size of the great dome determined upon; and nothing can be done until this focal length is known. No less than 19 trials have been made by the Messrs. Feil to cast a perfect crown disk, and a delay of more than two years has been incurred through the difficulties and risks of the operation. It appears that the Messrs. Feil have at last cast two suitable disks. There is, then, reason to believe that the rough disks for the large telescope will soon be in the hands of the optician. The successful working of these disks into the proper curve for a perfect object glass is a matter of the greatest difficulty, but the extraordinary skill which the Clarks have acquired in the making of the objectives for the National Observatory (26 inches), the observatory of the University of Virginia (6½ inches), the Princeton College Observatory (23 inches), the Imperial Russian Observatory at St. Petersburg (30 inches), leave no doubt that within two or three years after the receipt of a perfect disk the whole 36-inch objective (the largest possible) will be finished. While the objective is making, the dome and the mounting can be constructed, so that the whole delay is and has been due to the difficulties incident to the optician's work. The work on Mount Hamilton has progressed as far as possible under the present conditions, and it will not be long before California possesses the most perfect observatory in the world, placed in the most favorable situation which can be found.

**Boring with Compressed Water.**

When the French engineers first began the Mont Cenis Tunnel, says a Paris correspondent of the *Boston Herald*, the work was done in the old-fashioned way by means of hand-drills and blasting. Later, machines were invented driven by compressed air, which did away with the hand-drills, and by the aid of which the work was successfully completed. Similar but improved machines were employed in the piercing of the St. Gothard; but when Mr. Brandt undertook the piercing of the Aarberg, he proposed to the contractors to substitute compressed water for compressed air. He invented a special apparatus for the purpose, and the experiments made with it in the Westphalian mines were so satisfactory that his proposition was adopted on the western side, while the piercing of the eastern gallery was to be done by the same means as had been employed on the St. Gothard, known as the Ferroux machine. After a few months' experience it was demonstrated that the Brandt was in perforating power the equal, if not the superior, of the Ferroux machines, while it possessed an undoubted superiority for the ventilation of the gallery, and consequently for the health and comfort of the workmen. When I saw the Brandt machine at work I was struck by the contrast between its smallness and the greatness of the task it had to accomplish. In appearance and size it resembles an old-fashioned 6-pound field piece. The drill has a diameter of 30 inches, and consists of a circular auger, which is held powerfully against the rock by means of a hydraulic pressure of from 100 to 120 atmospheres, while at the same time a rotary movement is imparted to it. The pressure against the face of the rock is the result of a column of compressed water contained in the cannon-like cylinder of the machine; inside of this cylinder is a fixed piston-rod, a detail in which the Brandt machine differs from all other similar drills, in which it is the cylinder that is fixed and the piston-rod that is movable.

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Paris, 1878.



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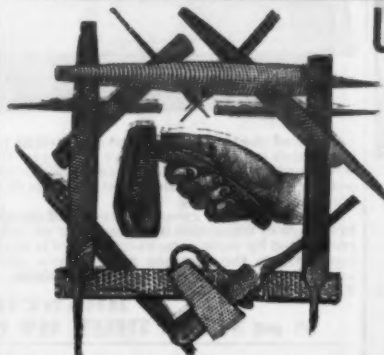


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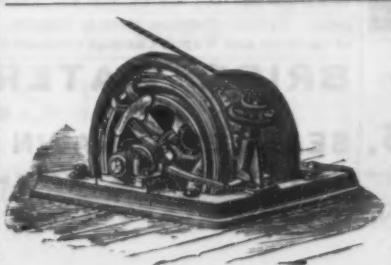
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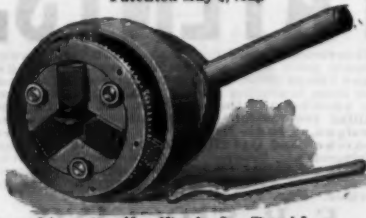
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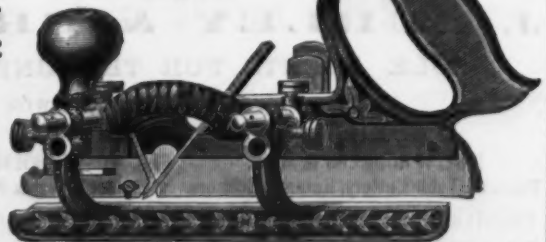
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gines placed on either side. The drill will make, according to the nature of the rock, from 5 to 12 revolutions per minute, and it can be driven to a depth of 39 inches. When it is withdrawn a dynamite cartridge is inserted and the face of the gallery is blown down. By means of four of these machines a gallery 16,300 feet long, with a heading of 10 square yards, was driven into the western side of the Ariberg during the same space of time that six Ferroux machines were driving a similar gallery 17,900 feet into the eastern side of the mountain. The daily rate of progress varied greatly, according to the nature of the rock traversed. Sometimes a stratum of exceptionally hard rock would be encountered, and sometimes the strata would be so friable that the roof and sides of the gallery had to be immediately protected with shoring. At the start the average daily progress did not exceed 6½ feet, but toward the end 26 feet were the minimum, and 37 feet the maximum, of a day's work. As high as 100 cubic yards of rock were sometimes removed during 24 hours, and an average of 500 cubic yards of masonry were built per day. About 2,000,000 pounds of dynamite were used in this blast, and most of it was manufactured on the spot, in large frame buildings erected for the purpose in isolated spots at either end of the tunnel. In the construction of the gallery the same system employed at the St. Gothard Tunnel was adopted. This system consists in the establishing of a principal gallery and of a second gallery parallel to and above the principal one. The dimensions of the former were 8 feet high by 9 feet wide, which allowed six miners to work at the same time. The upper gallery, 7 feet high by 6½ feet wide, would only permit four men to work.

### Mexican Railways.

At a recent meeting of the Pittsburgh Engineers' Society, Mr. Emile Low, who spent several years in Mexico engaged in railroad engineering, read an interesting paper on the "Mexican Railway System." He stated that at present the industries of Mexico are not very extensive. During the Spanish reign all manufacturing was forbidden, the main industries of the City of Mexico being nearly wholly confined to the making of gold and silver ware and the manufacture of tobacco. The most extensive trades now are the making of tallow and wax candles, as well as leather, hats being also a specialty. The area of Mexico is 704,400 miles, or about one-fourth that of the United States, the population being 10,000,000, or less than one-fifth that of the United States. The country is fairly, if not densely, populated. Exports from Mexico are increasing in value from year to year, the increase last year being 10 per cent., and the increase is almost equally divided between general merchandise and the precious metals. The bulk of the general merchandise went to the United States, which also received a large portion of the specie. The great drawback on Mexican export has been the lack of transportation facilities, and this objection is rapidly disappearing, so that before long the great mineral resources of Mexico will be thoroughly thrown open to the world.

The recent growth of the railway system of Mexico is one of the marvels of the era of the locomotive, for until but recently the only railroad in Mexico was that between the City of Mexico and Vera Cruz, known as the Mexican Railway and being 264 miles long. This road has branches to Puebla and Jallapa, adding 100 miles to the length of the old system. The materials for this road were transported overland at an enormous expense. The great amount of money spent in the construction of this road prevented other roads from being constructed, because it was supposed that there were peculiar obstructions to railroad building to be encountered in that country. Since this question has been examined into, and the opinion stated found to be erroneous, there are 19 different railroads in the Republic, which run over 3423 miles of the country, nearly all of which have been built within the last five years. The most important of the roads is the Mexican Central Railway, the articles of association of which were signed in Boston, February 25, 1880, under the general railroad law of Massachusetts. The charter of the road was transferred to Robert R. Symon and associates by General Diaz, the President, April 3, 1880. The capital stock was fixed at \$5,400,000, which was taken by the Atchison, Topeka and Santa Fe, and the Chicago, Burlington and Quincy railroads, and by American and foreign bankers. Thomas Nickerson, of Boston, was elected president. The first surveys were commenced in the City of Mexico, under Howard Schuyler, chief engineer (now deceased), about the last of June, 1880. Track-laying was commenced about December 15, 1880. The greatest difficulty encountered at first was with the "peons," or Mexican laborers, who were entirely unused to steady work and American punctuality. Ten thousand men were employed. On September 15, 1881, the road was open to San Antonio de Tula, 58 miles. After this construction went on more rapidly, and on the 8th of March, 1884, the final spike was driven, opening the road from El Paso del Norte to the City of Mexico. The road runs from El Paso through the States of Chihuahua, Zacatecas, Aguascalientes, Guanajuato and Mexico, a distance of 1224 miles. The branches of the road from points in it to Guanajuato, Tampico, the Pacific coast and the Tintim Tract swell the total number of miles to 1760.

The Government concession grants to the road a subsidy of \$15,200 per mile of the road constructed and approved by the Department of Public Works. The salaries of the engineers are fixed, as are also the rates for transportation of freight and passengers, the rate for the latter being fixed at not above 4½ cents per mile for first-class, 3½ cents per mile for second-class and 2½ cents per mile for third-class passage. The Government also obligates itself not to give any subsidy to any parallel line which may be established within a zone of 65 miles on each side. The Mexican National Railway is being built in accordance with a decree of the Mexican Congress, executed on September 30, 1880, the concession being granted to James S. Sullivan. The road, through its president

and American promoter, General Palmer, is known as the Palmer-Sullivan road. It is authorized to build the following divisions: From the City of Mexico to the Pacific Ocean at Manzanillo, from Mexico to the northern frontier to Lando or Eagle pass, through the cities of San Luis Potosi, Saltillo and Monterey. Also branches from Matamoros to Monterey, from Zancaticas to San Luis Potosi, and from Zancaticas to Lagos. The subsidies allowed are smaller than those of the Mexican Central, and the road is therefore allowed to charge for first class passage 6½ cents; for second class, 5½ cents, and for third-class, 4 cents per mile. The total number of miles at present in operation is 696.

Besides the important roads mentioned, Mr. Low described 16 roads of various lengths, which may be enumerated as follows, the miles given being those at present in operation: Senora Railway, 205 miles; Mexican International, 156 miles; Morelos Railway, 99 miles; Inter-Oceanic Railway, 100 miles; Yucatan lines, 65 miles; Pueblo and San Marcos Railway, 36 miles; Vera Cruz and Medellin Railway, 10 miles; Sinaloa and Durango Railway, 40 miles; Tehantepec Railway, 31 miles; Esperanza and Tehuacan Railway, 31 miles; San Martin Tex. Melucan Railway, 23 miles; San Andres line, 7 miles; Pueblo and Matamoros Railway, 57 miles; Nautcha and San Marcos Railway, 4 miles; Vera Cruz and Alvarado Railway, 34 miles; Hidalgo line, Irolo to Pachuca, 35 miles. The sum of all the miles at the present day in actual operation foots up to the comparatively large number of 3423 miles.

General Grant obtained a concession in 1881 for the proposed Mexican Meridional and Oriental Railway," said Mr. Low, "which was to run from the City of Mexico through Puebla, Quaxaca and Tehuantepec to the southern frontier or boundary line between Mexico and Guatemala. It also includes several branches. The head and front of the company which was organized was Jay Gould. There was some trouble in the company, however, and Grant's grand Mexican scheme proved a fiasco before the work had begun. Other roads proposed, on which work has not yet begun, are the American, Mexican and Pacific, Central Table Land, Mazatlan and Jopic, and New York, Texas and Mexico railroads."

A matter of interest which the speaker gave was a table showing the routes overland from New York to the City of Mexico. This table was as follows:

First Route.	Miles.
New York to St. Louis.....	1,045
St. Louis to Longview.....	588
Longview to Palestine.....	81
Palestine to Laredo.....	415
Laredo to Mexico, via Mexican National Railway.....	888
Total.....	3,082
Second Route.	Miles.
New York to St. Louis.....	1,045
St. Louis to Kansas City.....	281
Kansas City to Topeka.....	96
Topeka to El Paso.....	1,091
El Paso to Mexico, via Mexican Central Railway.....	1,224
Total.....	3,742

Showing that, when the Mexican National Railway will be finished, the distance from New York to the City of Mexico will be shortened by 700 miles.

**Postal Treaty with Mexico.**—The special postal convention between this country and Mexico, the execution of which has been pending for some time past, was signed on the 21st inst. by Postmaster-General Hatton, on the part of the United States Post Office Department, and Mr. Romero, the Mexican minister, on the part of the Interior Department of his Republic. The convention still requires ratification by the Mexican Senate, which is now in session, and approval by the President of the United States. It will, if ratified and approved, of which there is no doubt, go into effect on January 1 next. Under this convention the postal systems of the two Republics, as to their international postal relations, will be unified. United States domestic postage rates and conditions will apply to mail matter for Mexico, except samples of merchandise, ores, &c., packets of which, though liable to the domestic rates, are to be restricted to 12 ounces weight and 12 x 8 x 4 inches in dimensions. The Mexican rates on matter for the United States will be as follows: Letters per 15 grams (nearly ½ ounce), 6 cents Mexican silver currency. Post cards each 3 cents. Second-class matter (same as that in the United States), 4 cents per 480 grams. Third and fourth class matter, including samples of merchandise, &c., 2 cents per gram. The sample conditions as to size and weight of packets are the same as when sent from the United States to Mexico. The fee for registration in both countries will be 10 cents. Third and fourth class matter in Mexico comprises generally the same matter thus classified in the United States domestic mails, but includes commercial or business papers, which in the United States domestic mails are first class.


The longest tunnel in the southern hemisphere has been recently completed. It will conduct the waters of the Nepean and Cordeaux rivers to the Cataract River, at a point from which they will be led by a canal to Sydney to form the water supply. This tunnel, which is about 7 feet in height by a little over 9 feet wide, extends from the Nepean to the Cataract River, a distance of 4½ miles. It is three years ago last July since the contractors began to drive the tunnel through the sandstone, and as soon as they commenced work they knew they must lose a large sum of money on the contract, which was for a little under £70,000, but the outlay has been many thousands of pounds in excess.

On the 23d inst. the assignment was announced of Charles T. Dumont, proprietor of a foundry and machine shop at Cincinnati. His liabilities are estimated at \$25,000 and assets at \$18,000. Previous to the assignment a lien had been given for \$3200 in favor of Hoeflinghof & Lane, and mortgages to the amount of nearly \$14,000 to Albert Paddock.



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SECOND, I further undertake and agree to and with the said John Wilson, and his legal representatives, not to manufacture or sell, or cause to be manufactured or sold, at any time in the future, Knives or other Outlery, bearing his trade-mark aforesaid, or any imitation or simulation thereof. IN WITNESS WHEREOF, I have hereunto set my hand and seal at West Mansfield, aforesaid, this thirty-first day of May, 1883.

WITNESSES:  
E. M. REED,  
(Attorney for Defendant.)

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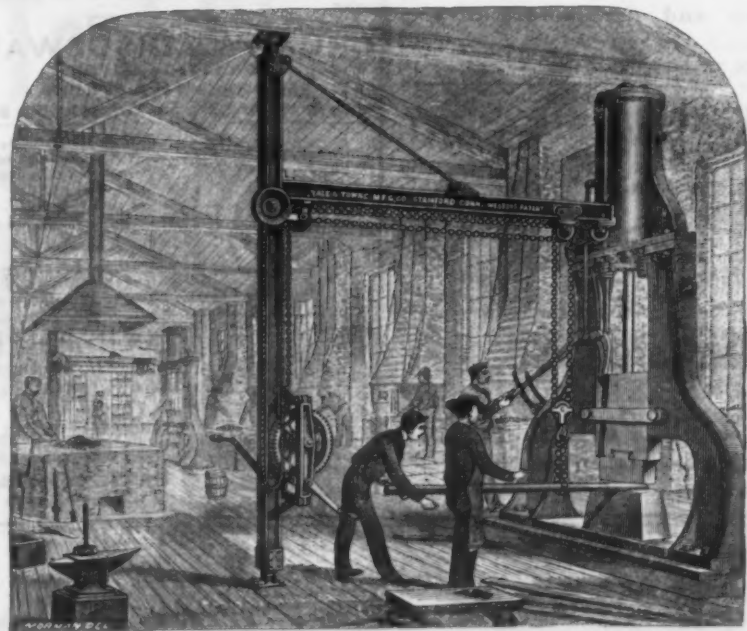
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## On a New Method of Heating the Regenerative-Gas Furnace.\*

In every description of furnace which has hitherto been designed, either for heating or melting, it has always been considered that the first condition of successful working was to make the space to be heated as small as circumstances would allow, so that the flame might be brought into as intimate contact as possible with the inside lining of the furnace, and more especially with the material under treatment. This method of constructing and working furnaces, which was a necessary condition of success in all cases in which it was proposed to obtain a high temperature with the use of solid fuel, was also adopted in regenerative-gas furnaces, which until quite recently were heated on the same principle. The author, however, has for some time doubted the correctness of this view, and from experience gained in the practical working of this class of furnace, after long and careful trials, has satisfied himself that they should be arranged so that the flame should only radiate heat upon the material to be heated or melted, and not come into actual contact with it, as has hitherto been the case. Further practice on the same lines has led to the development of the mode of heating to which he wishes to draw the attention of the Iron and Steel Institute on the present occasion.

The gas and air ports, instead of being so arranged that the flame shall impinge upon the materials placed on the bed of the furnace, as hitherto, open at some distance below the roof of the melting chamber, and at some distance also from its side walls, so that the gas and air after ignition have unobstructed space for entering into combustion; and for the free development of the flame, which is kept as much as possible from contact with the roof, walls or materials on the furnace bed, and when these are crucibles, ingots, blooms or packets of iron they should be placed sufficiently far apart to allow the radiant heat to have free access all around them. Where there are working doors, the flame should pass above their level; in this way the men will not be inconvenienced while watching operations inside the furnace; but, as already mentioned, the main object to be secured is to avoid contact of the flame with the materials under treatment, or with the walls of the furnace. In constructing furnaces according to this new method of heating, the air inlet may be arranged above the gas inlet, thus forming two parallel horizontal ports for the delivery of the gas and air in broad streams into the furnace chamber, the inflowing air overlapping the gas at each side; or the gas and air may be brought into the furnace chamber in several streams side by side, the air ports, which are more numerous than the gas ports, being also placed at a higher level than the latter; or, again, as shown in connection with a crucible-steel melting furnace, as the length of travel of the flame is comparatively short, the gas is brought into the chamber by two ports, having an air port between them, and additional air ports on either side, the ignition commencing as soon as the air and gas, which are delivered in thin streams, reach the height at which the flame is to travel across the furnace from end to end. This arrangement is one which could be applied in other cases, where, on account of the shortness of the melting chamber, the air and gas have to be well mixed on ignition to secure complete combustion before their exit at the other end of the furnace. In cases in which there is a great length of travel for the flame the ignition is retarded by means of a horizontal wall or tongue, so that it shall only take place at the entrance of the gas and air into the furnace chamber, and the combustion may be extended throughout the furnace, the flame in this case taking a semicircular or horsehoe course. The furnace as now built appears at first sight to be unnecessarily high and wide, but this new method of heating high-temperature furnaces by radiation requires a large space for the development of the flame, and for securing the advantages which may be obtained by its use.

In order to realize the circumstances under which these benefits are obtained, it must be borne in mind that in the regenerative-gas furnace the amount of fuel used does not depend so much upon the intensity as upon the quantity of heat required, whereas in the old furnaces, in which direct combustion of solid fuel takes place, intensity can only be obtained by means of a strong chimney draft or a blast, and the consumption of very large quantities of the best fuel; and even with their use the highest temperatures required in the arts are difficult to get, and still more so to maintain, the difficulty and expense increasing with the size of the furnace. Thus it has been ascertained that in an ordinary crucible-steel melting furnace, heated by means of solid fuel, about 2 per cent. only of the heat developed is taken up by the steel, so that nearly the whole of the great mass of coke used is expended in getting up and maintaining the furnace at steel-melting temperature. In a regenerative-gas crucible-steel melting furnace, on the other hand, when once the steel-melting temperature has been reached, it is easily maintained with a moderate chimney draft, and therefore by the burning of a comparatively small quantity of fuel, which may be of a poor quality, so that the greater part of the heat of combustion is taken up by the steel, while what remains amply suffices to maintain the crucibles and furnace at the necessary temperature, and only a very small quantity escapes through the chimney. The following is an actual comparison between an ordinary reheating furnace using solid fuel and one on the regenerative-gas principle. The former uses about 3 tons of a fair quality of coal in a shift of 10 hours, while a regenerative furnace of equal capacity takes about 2 tons for the same time, there being a saving of 33½ per cent. But if both furnaces are merely kept at a welding heat, without any cold iron being charged, then the solid-fuel furnace requires about 2½ tons of coal per 10 hours, while the regenerative-gas furnace takes ¼ ton at the outside; so that, when it is only necessary to maintain a certain temperature,

\* Paper read by Mr. Frederick Siemens at the Chester meeting of the British Iron and Steel Institute.

the regenerative-gas furnace shows an economy of 80 per cent., while it is 33½ per cent. when both furnaces are bringing iron up to the welding heat. The results here given are from the author's personal observation, but in some cases the advantages gained by the use of the regenerative-gas furnace for heating purposes have been greater, reaching from 40 to 50 per cent.

It is evident from the above considerations that in regenerative-gas furnaces a flame of very high temperature is obtained, such as is required for working by radiation, while the greater part of the heat so produced is taken up by the material charged, and that therefore there is no reason why the heating chambers of these furnaces should not be enlarged to any reasonable extent, and at the same time be built so that the flame does not come into contact either with the sides and roof or with the material to be heated. Not only does the regenerative-gas furnace lend itself to this mode of construction and of application of the flame, but experience proves that great economy in fuel is thus effected, to which must be added in many cases the indirect saving obtained by a considerably increased output and the improved quality of the material produced when it is not exposed to contact with the flame, while the furnaces themselves last much longer. There can be no doubt that the very remarkable results of improved quality and increased output of material, with a longer life of the furnace, can only be brought about when the active flame is not allowed to act upon the materials within the furnace, the interruption of the process of combustion by the interposition of solid bodies always tending to injure or even destroy them. But, besides the circumstance that solid bodies are injured by flame, it can be easily shown that when flame is brought into contact with any solid body it is more or less quenched, according to the substance, size and temperature of the body.

A very simple experiment in proof of this, and one which is familiar to most people, is the following: Take any ordinary illuminating gas flame, such, for instance, as a batwing, and place a glass rod or tube into the middle of it; the flame will immediately burn dull and a large quantity of lampblack will be deposited on the piece of glass. This action is most marked when the rod is cold, but takes place, though in a less degree, at any temperature, for the reason that the material to be heated is necessarily always at a lower temperature than the flame, also owing to the disturbance in the combustion caused by contact of the solid substance with the flame. The author hopes shortly to treat this subject more fully from a physical point of view; but the experiments he has made establish the following most important fact, namely, that a good flame, or, in other words, perfect combustion, can only take place in an open space, or in one of sufficiently large size to allow the gases to burn out of contact with solid material. To show more clearly the advantages which have been so far derived from the application of this new system it will be well to give a few examples of comparative results in working regenerative-gas furnaces constructed on the old and new principle. A glass-pot furnace, built at Dresden 10 years ago, and which has been reconstructed for experimental purposes, shows the economy of this method of heating most effectively. This furnace held 10 pots, and melted glass every night, which was worked out during the day, giving a daily production of about 3000 bottles in a shift of seven hours, or, after allowing for pot breakages, a monthly production of 70,000 or 80,000 bottles. The pots lasted about three weeks, and the furnace itself about six months; during this time it required many repairs, which naturally interfered with its production. At present the same furnace, supplied with the same quantity of fuel, and working the same charges, produces daily 5000 bottles in a shift of nine hours, amounting to a monthly production of 130,000 to 140,000 bottles. Fewer pot breakages also occur, less repairs are required, and the amount of waste has decreased; moreover, the glass metal is obtained from a cheaper composition than hitherto used, and proves to be of a far superior quality. The pots last fully double the time and melt more than three times the quantity of material, while the furnace itself stands for three years—that is, it lasts six times as long and melts more than nine times the quantity of material it did previously to its reconstruction. As the flame is kept away from the working holes, the glass-blower is able to work more at his ease and to turn out a better product, besides being able to heat his glass in the furnace without tarnishing it.

There are also several other advantages of a minor character, which, with those already referred to, enable the glass-blower to supply over 50 per cent. more goods without much greater exertion on his part. Another furnace, from which lamp-glass chimneys are made, gives still more favorable results. The mixture employed is much more refractory than before, and the glass produced is of a better quality and of a whiter color, while the glass-maker is now able to produce this superior kind of glass in open pots—that is, in the same manner as common glass is made. The result is that the closed pots formerly used for melting the finer qualities of glass, in order not to expose the batch or mixture to the direct influence of the flame, are no longer required, whereby a considerable saving in pots and fuel is realized. Similarly advantageous results are attained in the open-hearth steel-melting furnace. At the Landore Siemens Steel Works, near Swansea, the furnaces which were altered at the end of last year and at the beginning of this to this new method of heating have already outlasted the furnaces reconstructed upon the old type at the same time, while they work more uniformly, giving an improved and larger output, owing to less oxidation of metal, as is proved by more ore being required per ton of pig iron used in order to decarbonize it to some extent. The life of these furnaces is expected to be five or six times as long as that of the old furnaces, while great economy in the consumption of fuel per ton of steel melted should be realized.

This method of heating is now being adopted at several other steel-melting works



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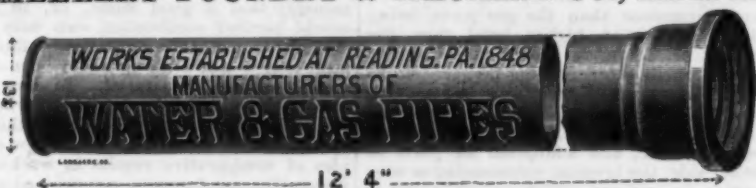
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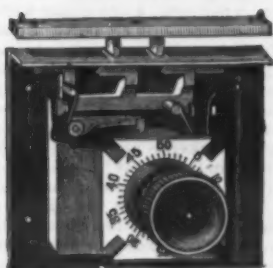
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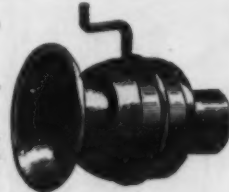


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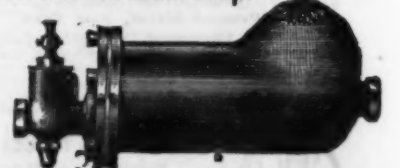
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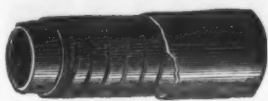
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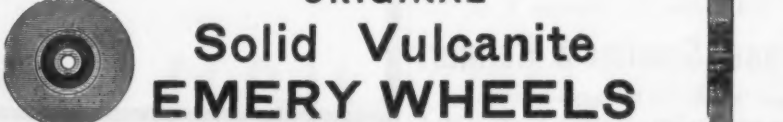


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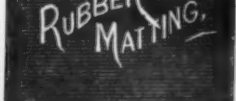
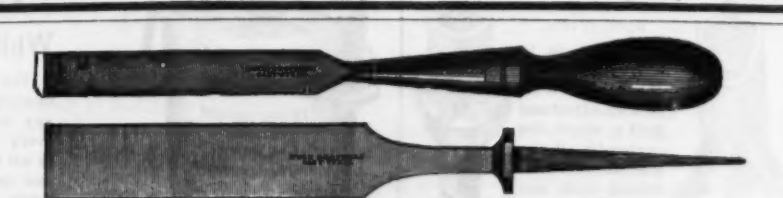
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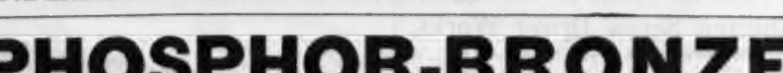
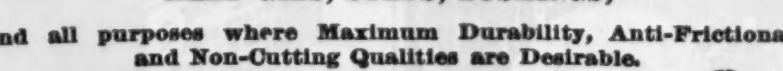
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A new process for working lead fume into litharge and red lead has been described in the Journal of the British Society of Chemical Industry. The fumes evolved from the working of galena contain lead sulphate, sulphite and oxide, arsenic and antimony, also lead sulphide, and, when zinc ores are present, zinc oxide. The lead fume is mixed with sodium carbonate or hydroxide, and roasted. The roasted product is then washed, whereby sodium sulphate and sulphite, and sodium compounds containing arsenic and antimony, are separated. The lead compounds are converted into lead oxide by this treatment. The lead fume may be boiled also with a solution of sodium carbonate or hydroxide, lead carbonate and hydroxide being formed, while arsenic and antimony are dissolved. The washed precipitate is then roasted. In the presence of zinc compounds they are removed by boiling with sulphuric acid. If lead sulphide be present, it is necessary to boil first with a solution of calcium hypochlorite. Sodium sulphate is recovered from the liquors after separating arsenic and antimony.

A process for separating gold and silver from arsenide of iron, patented by E. Probert, of Eureka, Nev., is as follows: The arsenide of iron is first melted in a shaft, cupola or other furnace, and is then tapped out into iron pots lined with clay or other refractory substance. While the material is still in a fluid state and at the highest temperature, one-twelfth of its weight of granulated litharge or granulated lead is introduced. The litharge is reduced by the action of the de-oxidizing agents contained in the arsenide of iron, and the lead is precipitated, carrying down the silver and gold alloy with itself. The granulated lead, when used in place of litharge, acts in a similar way, though with less effect, alloying itself with the silver and gold during its passage downward through the bath of molten material. In order to remove the argentiferous or auriferous lead alloy from the pot, a small tap-hole is provided in the bottom, or the whole contents may be allowed to cool and the lead alloy finally be separated after the solid block has been removed from the pot.

A new process of making brass and other ornamental goods patented by H. & J. Grom, of Newark, N. J., is designed to reduce the cost of manufacture and to secure a better finish. A lead core piece having the contour of the article to be produced is cast in a mold and trimmed off in a lathe by a knife. Over the core thus prepared is spun a plating of sheet brass or other metal. The soft metal core, being pliant, yields in a slight degree under the spinning process, and allows the brass to be formed into shapes which it would be impossible to make over a hard core. After the spinning process is completed the article is trimmed or otherwise finished for the market. The heat generated by the spinning process causes the sheet to expand, so that its subsequent contraction brings the parts to such a complete union as to make them practically one. It is said by the inventors that the finished article will receive an impression with sharp outline from a die, much resembling an engraving.

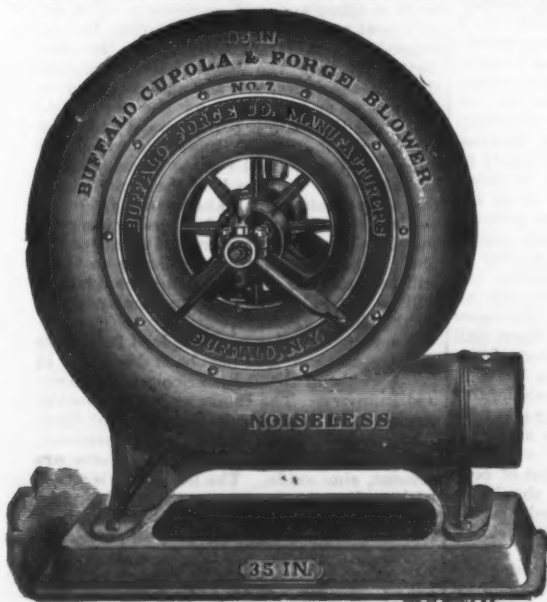
A crank-shaft of novel form has been invented by F. Trump, of Springfield, Ohio. The inventor states that in the manufacture of crank-shafts from round iron much difficulty has been experienced in bending the iron to form the cranks and to cause them to retain a proper degree of pitch with relation to one another. The new shaft or blank is triangular in cross-section, with flat surfaces, and the cranks are in planes substantially at right angles to the flat surfaces of the shaft. Located upon the shaft and cranks at desired points are journal bearing spools having openings of a shape substantially corresponding to the shape of the shaft in cross-section. It is claimed that by the use of the angular shaft much of the material may be done away with, and that a shaft equal in strength to a round shaft is secured.

A protecting ring for the edge of a scale-pan has been invented by G. H. Chattillon, of New York City. The scale pan is bent downward at its edge, and is covered by a coat of enamel. In order to protect this enameled edge a ring is placed around it which overlaps the top and bottom edge of the scale-pan. This ring is by preference made of sheet metal and nickel-plated. The suspension hoop is provided at its bottom with lips that catch beneath the edge of the ring, and are fastened to the pan by means of straps and screws. The connection is so made that the suspension hoop is supported by the ring, as well as by the pan, and in this way the ring serves to materially strengthen the connection.

By a drag saw patented by F. W. Yowell, of Sidney, Iowa, it is claimed one man can do the work of four men with the ordinary cross-cut saw. This drag saw consists essentially of a frame carrying two inclined saw guides which reach from the top to the bottom of the machine and are placed at such a distance apart as to cut the wood the desired length. The saw blades are placed horizontally and pass through slots or kerfs in the guides. At their rear ends the saw blades, or their handles, are pivoted to a weight that is suspended from the top of the frame by means of a wide, flat, steel spring. The block of wood to be sawed is placed upon a buck formed between the lower ends of the saw guides. Then the weight is



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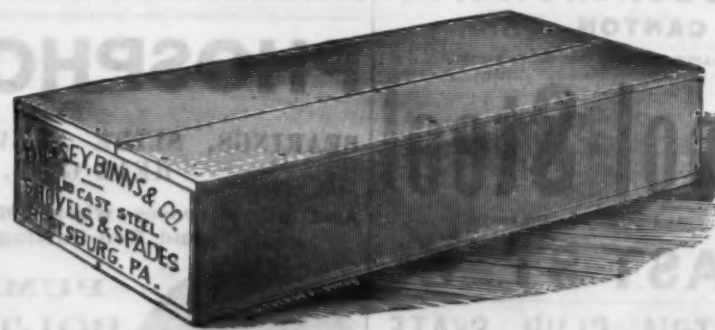
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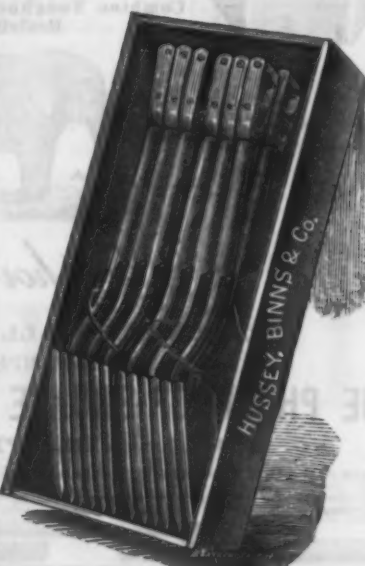
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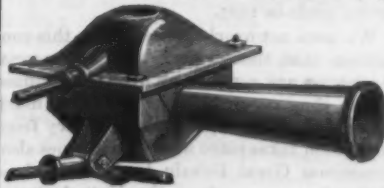
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oscillated to and fro by means of a rope, and in this manner the saws are reciprocated and cut the wood. The wood is clamped to the buck by means of a lever that is pressed down by the left hand, while the right hand operates the saws.

A riveting machine patented by J. F. Allen, of Brooklyn, N. Y., consists of a long upright V-shaped frame, the arms of which are connected at the top and open at the bottom. On the free end of one arm the riveting device is attached. This device consists of a cylinder with piston or hammer and piston-rod, the latter being at its end made with a cavity corresponding to the desired shape of the finished rivet-head. The other arm carries a cylinder in which a heavy piston is made to work acting as an anvil. The end of the rod of this piston forms the die for the rivet-head and holds the rivet and machine in place during the operation of the hammer. At the same time this rod presses the plates of the boiler shell together, as the end of the riveting device bears against the opposite side of the plates.

An attachment to spade handles, which is to facilitate the forcing of the blade into the ground and the lifting of the load has been patented by B. S. Boyles, of Winamac, Ind. The attachment consists of a piece of wire bent to form a prong at the top and bottom, and having its body formed into a horizontal loop. Upon this loop is placed a common tubular wooden sleeve or handle, which, however, must be put in place before the wire is bent. In order to attach the device, two of the rivets that pass through the spade handle and straps are first taken out, and the prongs are inserted in their place. The prongs are then clinched and made to serve the purpose of the removed rivets in holding the straps to the spade handle. The wooden sleeve is thus placed in the front of the spade, and a short distance above the blade, so as to be at convenient distance from the hand.

A carpenter's vise of improved construction has been invented by J. F. Miller, of Pittsburgh, Pa. Heretofore the main screw and its enlarged head were turned out of the same block, and, besides the loss of material occasioned, considerable time was wasted in reducing the screw. The inventor proposes to form the screw and head separately and to connect them by a pin and mortise. An annular metal plate is fastened against the outer end of the movable jaw, and through this plate and the jaws the screw is inserted, so that its head rests against the plate. A pin passing diametrically through the screw, directly back of the plate, permits it to be revolved while serving to retain it in position. A nut of the ordinary construction receives the end of the screw, and the usual lever is employed for turning it into or out of the nut.

A device termed by its inventor an "anvil for lathes," and intended to support a piece of work from which a spindle is to be detached or affixed, is of the following description: A head made of cast iron and plated with steel is composed of two arms or shanks meeting at a sharp angle. Into the head, near its corner, a circular depression is formed that is filled with soft metal. The head rests upon a ball which is of similar shape in cross-section as the head. If a wheel or other article is to be detached from its arbor, the latter is placed into the crotch of the head, with the wheel resting upon its face. The arbor may now be driven out by a hammer. The block of soft metal is used for the purpose of allowing the arbor to be detached by striking it, end downward, upon the block. J. Birkenhead, of Mansfield, Mass., is the patentee of this anvil.

An improvement in water-tube boilers, which has for its object to adjust in place the plate plugs that close the hand-holes in the header, has been patented by M. Fleisher, of Philadelphia, Pa. Boilers of this character consist of groups of tubes, the ends of which are expanded into the steam circulating end chamber known as the "header." The hand-holes in the header must have a larger area on the inside than on the outside, and considerable difficulty has been experienced in introducing the closing plates into the holes. To overcome this difficulty the inventor makes the apertures that receive the tubes larger in diameter than the closing plates. By this construction the plates may be introduced from the inside and are readily put in proper position. After the plates are introduced the enlarged openings may be reduced to the proper size by a suitable bushing.

C. F. Wickwire and T. H. Wickwire, of Cortland, N. Y., have patented an improvement in the manufacture of painted-wire cloth. The cloth, after being painted, is passed over a series of rolls at the top and bottom of a drying chamber. The patented improvement has for its object to prevent the paint from adhering to the rolls and leaving the cloth imperfectly coated at some places. To this effect a trough is placed under each roll into which the same dips as it revolves. The trough is filled with any suitable liquid solution which will adhere to the rolls and at the same time repel paint. The inventors state that in practice a solution of soap in water will answer best. The claim of the patent covers the process of applying to the carrying rolls a paint-repelling compound.

T. W. Foster, of Providence, R. I., is the patentee of an improvement in the manufacture of spoons and forks made of rolled-gold-plated front and back plates with an intervening filling of hard or soft solder. The front plate is made in hollowed form by striking its edge downward. The back plate is made in a less hollowed form and is cut out to fit within the turned-down edge of the front plate. The two plates are then flushed with solder and secured to each other by properly heating them, after which the outline edge of the upper plate is burnished to properly extend the gold coating over its base metal edge. The handle may be embossed or otherwise ornamented if desired. The inventor states that spoons and forks made according to his process are of great strength and durability.

C. W. Danpher, of Norwich, N. Y., has patented an improved construction of car-wheel and axle, by which lateral movement of the former is to be prevented. The car-wheel is constructed with an inwardly-tilted

hub, which forms an increased bearing surface. Both the axle and wheel are, on their contact surface, provided with annular recesses in line with each other. The body of the wheel is hollowed out directly around the hub, and the chamber thus formed communicates by two narrow passages with the side of the wheel and also with the annular recess. Melted metal is poured through the inlet passage into this chamber, from whence it flows into the hub and wheel recesses. In this way the bearing surfaces are formed by the poured-in metal, which holds the wheel in place while allowing it to revolve freely on the axle. It is also said to prevent tilting or binding or any irregular movement of the wheel when the train passes over a curve.

An ore sampling machine for taking from large lots of ore small samples which will correctly represent the whole has been invented by D. W. Brunton, of Denver, Col. The ore is fed through a hopper upon the upper edge of an upright chute which may be oscillated to the right and left. Below the chute two spouts or receptacles are placed side by side. When the chute is oscillated to the right, the entire stream of ore is thrown into one spout, and when it is oscillated to the left, the entire stream is thrown into the other spout. The chute receives its motion by means of a driving bar and cam. At the outer end of the driving bar is opposite the circumference of a wheel which is connected to a suitable driving belt. The face of this wheel is perforated in two parallel rows, and into the perforations any number of pins may be inserted. These pins, striking the driving bar, operate the chute. It is evident that, as the number of pins in the two rows is varied, the time during which the chute throws the ore into either of the spouts is correspondingly varied. Thus the amount of ore thrown into either spout, at regular intervals, may be accurately adjusted.

A metallic packing-box of new construction has been patented by G. F. Griffin, of London, England. The box is of cylindrical or other form, and its upper edge is first bent down a short distance, then up and then again down. In this way an annular groove is formed around the box, which is open on top and closed at the bottom. Into this groove the flange of the cover is inserted. The inventor states the box is practically hermetically sealed by the spring action of the double bent edge. But, in order to provide an absolutely air-tight receptacle, a layer of paint, varnish or other material may be laid into the groove, so as to adhere to the can and cover and bind the same tightly together. As this material is placed entirely at the outside of the receptacle, it cannot possibly enter and injure the contents of the same.

An ore grinder patented by A. B. Paige, of Chicago, Ill., is of the following description: Around the upright shaft are secured an upper stationary and a lower revolving grinding plate. The grinding surfaces of these plates are cast with a series of recesses or cells, which are of rectangular or hexagonal shape. Beneath the lower grinding plate there is placed a runner having a flange that projects upward parallel to the edges of the grinding plates, but at a distance from them, so as to leave an intermediate chamber. At the top the flange is bent downward, and enters an annular gutter. The ore is fed by means of a hopper to the grinding plates, and the ground ore passes into the chamber around the plates. In this chamber, which is supplied with sufficient water to sluice the pulverized ore, the metal remains, while the lighter pulp passes over the runner flange into the gutter. Here it is freely agitated, so that the finer particles of metal remain in the gutter, while the lighter material is carried off. Steam is supplied to the grinding plates to heat the ore as it is being ground, so as to facilitate the grinding action.

**A Judicial Decision on "Futures."**

—A very important case was decided at Augusta, Ga., on the 22d inst., in the case of the National Bank of Augusta against Robert E. Cunningham, in the Superior Court, being a suit for payment of a note of \$3500 given by the defendant to Warren Wallace & Co., and discounted by the National Bank, based, it is alleged, upon futures in cotton, the note being given by Cunningham to a commission merchant to cover margins. The court charged that if the transaction was a speculation in futures the note was void in the hands of all parties, whether innocent holders or otherwise, and the jury found for the defendant. Judge Roney, in charging the jury, held that if part of the consideration was legal and part illegal the legal part should stand. This case has excited much attention, having been before the courts for some time. The Supreme Court in this case has also decided that future contracts are illegal and void. In delivering his opinion Justice Blandford speaks of faro, brag and poker as tame, gentle, submissive animals compared to this monster, future speculation, which he characterized as a ferocious beast allowed to stalk about in open midday with gilded signs and flaming advertisements to allure unhappy victims to its embrace of death and destruction.

**The Pennsylvania Store-Order Law.**

—Last spring about 60 employees of the Bethlehem Iron Company brought suit against the company for deducting store bills from their wages, which was alleged to be contrary to the act of June 29, 1881. The total amount involved is upward of \$20,000. Five of these cases came up for trial before Judge Albright, at Allentown, Pa., on the 23d inst., and resulted in verdicts against the company, the Judge holding that the company had no right to deduct store bills from laborers' wages. The trial created general interest, it being the first under the act of Assembly protecting the wages of laborers. Exceptions were taken at once by counsel for the company, and the cases will be carried to the Supreme Court. The decision of the higher tribunal will be final in the remaining cases as well as those appealed.

At the sale of the Government property at Harper's Ferry on the 22d inst. the Potomac water-power was sold for \$25,100, and the Shenandoah water-power for \$810.



# The Iron Age

AND

## Metallurgical Review.

New York, Thursday, October 30, 1884.

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#### Government Land Sales.

Among the various indications of national prosperity, sales of lands by the United States Government to actual settlers and railroad corporations have a special significance. They not only show a marvelous expansion of material resources, but also make it apparent how our agricultural and railroad interests are intertwined and interdependent. Not only these, but many of our most important manufacturing interests spring up rapidly in the line of actual settlement, and keep close company with the pioneers in railroad extension. The facts have forcible illustration in the statistics of the commissioner of the General Land Office for the fiscal year ending June 30. Notwithstanding the universal depression which in all latitudes and climes has of late weighed down the spirit of enterprise, the westward "course of Empire" is accelerated rather than retarded. Although meanwhile immigration has been comparatively restricted, the sales of lands have gone on unremittingly, rolling up an aggregate for 1884 surpassing all precedent. Taking the totals for a series of years, the comparison is as follows:

Year.	Acres.	Year.	Acres.
1879.....	8,649,259	1882.....	12,530,392
1880.....	9,000,495	1883.....	16,890,455
1881.....	8,979,518	1884.....	18,293,821
Total acres.....73,709,810			

From the foregoing it appears that during the last six years, including only such portions of the public domain as have been sold for cash or entered under the homestead and timber culture laws, over 73,000,000 acres of new lands have gone into the possession of producers, mainly for tillage, although it is known that grazing at the same time has developed on an enormous scale, and, according to an intelligent estimate, an acreage equal to one quarter of this amount has meanwhile been sold in small parcels by railroad corporations from previous grants.

It is likewise conjectured that, immigration having fallen off largely within the twelve-month, no small proportion of the more recent sales have been in consequence of migration from the older States—impoverished lands and depressed industries alike stimulating changes of locality conducive to individual prosperity, and no less directly affecting the national advancement.

Equally interesting as a subject of inquiry is the direction taken by the internal movement of population noted above. The "great Northwest" is, of course, the objective point, and an examination of the statistics shows that Dakota, as it was the year before, is the banner State. In that and the contiguous region the Northwestern system of railroads has had its chief development, naturally accompanying, if not preceding, the westward flow of population, and from thence deriving its largest revenues. The land sales of Dakota for 1884, although above 600,000 acres short of what they were in 1883, nevertheless make the magnificent total of 6,069,307 acres. Nebraska comes next, with 2,615,000 acres, while Kansas, Minnesota, California and Washington Territory follow in the order named, with sales approaching closely to 1,000,000 each. If we now take the leading States or Territories for a series of years, with the object of showing the position assumed by them respectively in the westward advance, the statistical array is as follows:

State or Territory.	1881.	1882.	1883.	1884.
Dakota Ter.....	Acres. 2,583,226	Acres. 4,555,038	Acres. 6,069,304	Acres. 6,069,307
Minnesota.....	848,928	1,065,736	1,222,969	987,876
Nebraska.....	643,300	884,028	1,315,104	2,615,101
Total.....	4,030,404	6,394,802	9,207,667	9,672,284
Mileage in operation.....	6,859	7,293	8,917	9,007

The Pacific coast, comprising California, Washington and Oregon, also advances with giant strides under the impulse of railroad progress and the united causes to which reference has been made. If individual fortunes have been sunk in the building of the Northern Pacific and the Oregon Railway and Navigation lines, it is none the less true that the stimulus imparted thereby to the material growth has an importance not easily exaggerated.

### The Extent of Our Iron and Steel Industry.

The statistics of production of iron and steel furnish data for a comparison of the growth of the domestic iron trade from year to year. They also enable us to measure our metallurgical stature with that of other countries. But to know what the absolute extent of the iron and steel industry is it is necessary to have accurate information of the number and location of the various works, the leading features of their respective plants, the character of their products and their productive capacity. Such information relative to American iron and steel works is contained in a little volume just issued by the American Iron and Steel Association, entitled "The Iron and Steel Works of the United States." This is the seventh edition of this invaluable directory to the American iron and steel works. It will doubtless be found thoroughly reliable, as that is a characteristic of all the work emanating from the hands of the secretary of the association, Mr. James M. Swank.

In glancing over the contents of this extremely interesting publication we observe a number of new names among the works now in existence in this country, the two years which have elapsed since the last edition appeared having been a period of considerable activity in the erection of new works in several branches of the trade. Extensions to old plants and a considerable increase in capacity are also decidedly noticeable. We are surprised to see in connection with the name of one very large establishment the remarkable statement, "Decline to give information." The owner of an establishment has, of course, a perfect right to withhold information about his works from the general public, but it is a cause of regret that any one connected with the American iron and steel trades should take such a stand when all his neighbors freely furnish corresponding information about their works. In looking over the list we also miss the names of a number of well known concerns which now have no active existence, but have been consigned to the lumber-room of "abandoned works." In this connection the preface of the new directory says:

Many of the furnaces retained in our list in 1882 and 1884, the capacity of which helps to form the aggregates for those years, have been out of blast for several years, and, being unfavorably situated and of antiquated construction, will probably never be put in blast. We do not positively know what their future will be, and hence do not feel authorized to place them in our abandoned list. This directory tells where furnaces are located, but it does not assume to point out those which cannot hereafter make pig iron at a profit, and hence have no more right to be counted as existing furnaces than if they had not been built. We use due diligence in ascertaining what furnaces have actually been abandoned, but we cannot class as abandoned a furnace which the owner tells us he has not abandoned. It is, however, our deliberate judgment that the whole number of furnaces in this country to-day which are in blast or will ever be put in blast does not exceed 600, instead of the 675 of which this directory furnishes a description.

A conspicuous feature of the publication is a tabulated summary of the number and productive capacity of the various kinds of

iron and steel works enumerated, a comparison being made with like figures taken from the previous edition in order to show the changes that have taken place during the two intervening years. The principal points of the summary are as follows:

Iron and Steel Works.	Sept. 1, 1881.	July 25, 1882.
Number of completed blast furnaces.....	675	686
Number of blast furnaces building: 10 bituminous, 2 anthracite and 4 charcoal, on September 1, 1881; total, Annual capacity of completed blast furnaces in pig iron, net tons.....	16	80
Annual capacity of the bituminous furnaces, net tons.....	9,900,000	8,000,000
Annual capacity of the anthracite furnaces, net tons.....	4,850,000	4,125,000
Annual capacity of the charcoal furnaces, net tons.....	3,175,000	2,750,000
Number of completed rolling mills and steel works building.....	434	400
Number of rolling mills making rails.....	4	16
Number of single puddling furnaces (a double furnace counting as two single ones).....	71	80
Number of heating furnaces.....	5,265	5,018
Number of trains of rolls.....	2,782	2,598
Annual capacity of rolling mills in finished iron and steel, net tons.....	1,555	1,494
Number of rolling mills having cast steel works.....	7,600,000	7,000,000
Number of Bessemer converters: 46 on September 1, 1881; 3 building, on September 1, 1882.....	81	66
Annual capacity in ingots, net tons.....	5,065	4,090
Number of completed open-hearth steel works building.....	2	2
Number of open-hearth furnaces building.....	67	158
Number of completed Bessemer steel works.....	21	15
Number of Bessemer steel works building.....	1	1
Number of Bessemer converters: 46 on September 1, 1881; 3 building, on September 1, 1882.....	46	36
Annual capacity in ingots, net tons.....	2,490,000	2,150,000
Number of completed open-hearth steel works building.....	35	27
Number of open-hearth furnaces building.....	3	5
Number of completed Bessemer steel works.....	58	51
Annual capacity in ingots, net tons.....	580,000	400,000
Number of completed crucible cast steel works.....	41	35
Number of steel castings.....	3,584	3,490
Annual capacity in ingots, net tons.....	115,000	105,000
Number of completed forges making wrought iron from ore.....	70	72
Annual capacity in blooms and billets, net tons.....	75,000	75,000
Number of completed bloomeries making blooms from pig iron.....	53	52
Annual capacity in blooms, net tons.....	70,000	70,000

It will be observed that there was a decrease of 11 blast furnaces in the period specified, but an increase of 1,300,000 net tons in capacity, showing that the old furnaces which have been abandoned were much smaller than the new ones which have recently been erected. The fact is recognized that it would be impossible for all the blast furnaces to be operated at one time, and the actual capacity is estimated in the preface at 25 per cent. below the nominal capacity above given, or 6,975,000 net tons. A number of interesting points are presented in this summary in connection with rolling mills and steel works, but only a few of them can be mentioned. The decrease in the number of rail mills is not surprising, but is probably very much larger than the table indicates, as many iron-rail mills now standing ready for work will never again turn out a rail. An actual increase in puddling furnaces flaunts itself in the face of our knowledge of the increasing substitution of steel for iron, but here also the chances are against the lighting up of many of them now standing idle. The growth of rail factories, Bessemer steel works and open-hearth steel works as indicated accords with current information, but crucible-steel works also show an increase, notwithstanding the claim that the cheaper steels are superseding the product of the pot. Forges and bloomeries remain practically stationary, both as to number and capacity. For other details of the extent and present condition of our iron and steel industry we refer our readers to the volume itself.

### The Cost of Making Steel Rails.

A recent issue of the Pittsburgh Penny Press contains an interesting article on the cost of steel rails. We do not know how accurate its information may be, but presume the details have been obtained from some well-informed person, as a Pittsburgh paper is exceptionally well situated for securing reliable data on such a point. The actual cost of producing a ton of steel rails in Pittsburgh is placed at \$26.83, as shown by the following itemized statement:

COST OF PIG METAL.	
1-10 tons of coke, at \$2.....	\$2.30
Limestone.....	.50
Ore, scale, &c.....	10.00
Labor, including repairs.....	1.75
General expenses.....	.38
Interest.....	.85
Cost of a ton of metal.....	\$15.18
COST OF INGOTS.	
1-15 tons of metal direct, at \$15.18.....	\$15.12
Refractories.....	.20
Lubricants.....	.02
Repairs.....	.24
General repairs.....	.17
Labor.....	1.18
General expenses.....	.09
Spiegel.....	2.31
Interest.....	.30
Cost of a ton of ingots.....	\$22.45
COST OF RAILS.	
1-6 tons ingots direct with initial heat, at \$22.45 per ton.....	\$22.60
Labor and office expenses.....	1.90
Repairs entire.....	.49
Steam (natural gas).....	.10
General expenses.....	.35
Interest.....	.22
Tools, files, &c.....	.15
Cost of a gross ton of steel rails.....	\$26.83

The Press also states that the cost of making a ton of steel rails in England at present is \$20.17.

### Fluctuations in Trade.

The British and Colonial Manufacturer is emulating our own Benner in forecasting the future of prices. It reaches a slightly different result from our local prophet, however. While he tells us to expect a slight reaction in 1885 from the depression now prevailing, which is only to be succeeded by a more severe depression, to continue until 1888, the Transatlantic student of price cycles comes to the conclusion that business is to be very much better than it has been for several years. Inasmuch as the commercial relations of the leading nations of the world are now so interwoven that it is impossible for one country to be conspicuously prosperous while the others are plunged in the depths of business stagnation, the prognostications of our British contemporary are of some interest to us, especially as its conclusions are drawn from the study of a series of elaborate tables, "prepared with great care and exactitude." The future which Mr. Benner portrays for us is so lugubrious that we feel like extracting as much comfort as possible from the researches and deductions of other inquirers into the course of prices.

The Manufacturer finds that in Great Britain each decade for the last 70 years repeats itself with marvelous regularity in its periods of inflation and reaction, with intervening years of good trade and depression. The retrospect begins with 1816, which was a year of a commercial crisis and financial panic that was followed by three years of depression and general stagnation. In 1820 there were signs of a slow, but decided, recovery, which developed in 1821 into general activity and confidence. Three years of commercial prosperity followed, but in 1825 overtrading and speculation were indulged in, terminating in a breakdown, with a financial panic. The year 1826—just 10 years, it will be observed, from the previous time of general depression—was a period of commercial crisis, which was followed by three years of depression, stagnation and distress. In 1830, as in 1820, the signs of prosperity began to show themselves, and the subsequent three years were fairly prosperous, developing into a period of over-speculation, which ended in the memorable breakdown of 1837. Only two years of depression followed on this occasion, the revival beginning in 1840.

From 1840 to 1844 there was general prosperity in trade and commerce, with the usual result of wild speculation, lasting two years, and terminating in a commercial crisis in 1847, followed by two years of general depression and distress. The year 1850 once more brought indications of returning trade, and 1851 was an extremely active year, followed by three years of general prosperity, leading up to overtrading and speculation in 1855 and 1856, terminating in disaster in 1857. The decade from 1860 to 1870 was a repetition of former decades in almost every respect. So also was the decade from 1870 to 1880, the British panic having been delayed several years after our financial revolution of 1873. The years 1880 and 1881, says the Manufacturer, were years of slow recovery in Great Britain. The past two years—and to some extent, with all its drawbacks, the present year—have been years of prosperity, the volume of trade having been large, though profits are small, the exports being nearly equal to those of the two most prosperous years, 1872 and 1873.

Commenting upon these facts, our contemporary says that in the past several decades the years of returning activity have been the second of the decade in all cases. The years of general prosperity have been the next three. The periods of overtrading have all commenced in the same year of each decade, though in three cases the period extended over two years, instead of one. Then followed a year of commercial crisis and financial failures, and in all instances except three there were three years of depression and distress. The length of the cycle has been the same in all cases except two, one of those having been nine years and the other eleven, thus equalizing the decades. If the present decade is in any sense a repetition of former decades, "we shall have a spin of 'restless speculation and endeavor to force 'trade.' The Manufacturer points out that this would inevitably be followed by a period of depression and distress, and, therefore, gently deprecates it, but at the same time its prognostication is decidedly in favor of active trade in 1885.

We must not overlook the fact in this connection that, though periods of commercial stagnation are common all over the civilized world, they occur in some countries much later than in others, and the recovery from depression takes place at different times also. Sometimes Great Britain leads off in these fluctuations; sometimes the United States goes first, and occasionally some other country is in the van; but after a decided change has once been made in either direction, it gradually becomes universal. If trade becomes very active in Great Britain next year, it will undoubtedly be very closely connected with commercial conditions on this side of the Atlantic, our relations being so intimate. We should consequently expect a very much better business, with some approach to the feverishness of overtrading, instead of the very mild reaction which Benner prophesies. We shall see in a little time which country has produced the true prophet.

### An English Railroad Scare.

The quotations for English railroad stocks seem to be as sensitive to adverse news as our own, notwithstanding the numerous criticisms made by our Transatlantic cousins on the instability of American prices. We draw this inference from the statement made in a recent London dispatch that certain English railroad stocks are falling in price "on account of American competition in rails." This effect must have been produced by the publication in England of the Canadian steel-rail contract recently secured by the Lackawanna Iron and Coal Company. Capital is traditionally timid, but in this case it must be exceptionally "scary" if holders of the stock of railroads located in the English mineral districts think that English steel works will seriously suffer from American competition in their export trade. We hope that our manufacturers will be able in time to secure many orders for steel rails from other countries; but we are not so sanguine in this matter as to believe that we shall at once secure a huge slice of the export trade enjoyed by the English makers. The English railroads, which now receive a great deal of business from the steel works located on them, will not, we think, have to cut down their dividends for some time on account of the diversion of foreign rail orders to American mills.

It must be observed, however, that, viewed from another standpoint, English railroad stockholders have great reason to regret the development of the American steel-rail manufacture and the great drop in domestic prices. The English steel works have lost a very large market in the United States through the establishment of enough works here to supply our own wants and the reduction in domestic prices to a point that absolutely prevents foreign rails from securing a foothold anywhere within our territory. The extent of the trade which has thus passed out of the hands of our Transatlantic competitors is very forcibly shown by the following table, which exhibits the quantities and values of the all-steel rails "imported and entered for consumption" in the United States for the fiscal years 1871 to 1884 inclusive:

Fiscal years.	Gross tons.	Value.	Fiscal years.	Gross tons.	Value.
1871.....	44,727	\$2,228,530	1878.....	3	\$95
1872.....	105,314	5,120,143	1879.....	2,593	66,254
1873.....	189,725	9,001,797	1880.....	32,309	1,643,701
1874.....	130,387	6,734,719	1881.....	166,239	6,101,251
1875.....	48,628	2,183,156	1882.....	198,355	6,998,188
1876.....	5,854	48,779	1883.....	69,189	2,835,615
1877.....	1,677	123,944	1884.....	7,884	384,697

### Our Shipping Interests.

In another column a correspondent bewails the fact that the vessels of the American Line, established for service between Philadelphia and Liverpool, have been sold to a foreign company. He alleges that this inglorious termination of an earnest effort to build up an American Transatlantic steamship interest is a result of the unequal terms on which American vessels are obliged to compete with their foreign rivals, such as higher rates of interest, heavy local taxes, higher wages to seamen, &c., and urges that the only way in which these inequalities can be overcome is first by securing an abrogation of local taxes on ocean vessels, and, second, by the payment of a subsidy large enough to equalize the difference in seamen's wages, &c. Curiously enough, our correspondent seems to have overlooked the fact that we are at present controlling quite a slice of the foreign carrying trade, with domestic taxation in full force, seamen's wages regulated by circumstances entirely, and no subsidies enjoyed whatever. In the direction referred to, our vessels meet foreign vessels on an equal footing, and actually vanquish them. If not, why should we have the bulk of this particular part of the foreign carrying trade. In the year 1883 American vessels carried \$54,783,743 in value of our imports from the West Indies, against \$32,525,348 carried in foreign vessels. The advantage is on our side both as respects steam and sail. This trade may be said to be small in comparison with Transatlantic trade, but the fact nevertheless remains, that, though foreign vessels are as free to compete for it as for Transatlantic business, we take the lion's share. If this is possible without any special favor being shown to American vessels engaged in this branch of our foreign carrying trade, what becomes of the lamentations we so frequently hear of our inability to compete with our rivals on the ocean in other directions?

Appropos of the interest now being taken in questions affecting our maritime position, it may be well to note what the old and well-established lines are doing at present. Owing to the low rates of freight obtained by ocean steamers in our European trade, the fleet plying between this city and Transatlantic ports is to be materially reduced the coming







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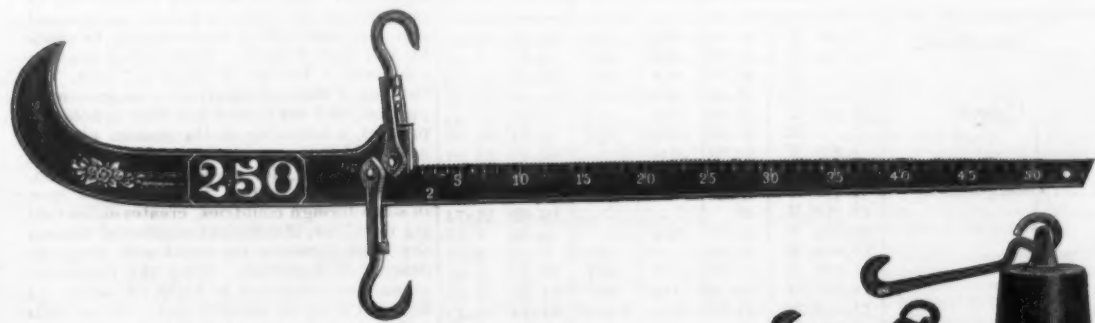
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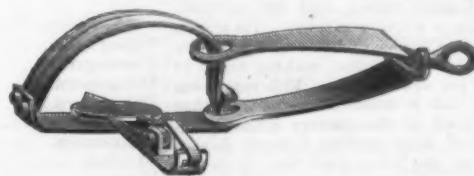
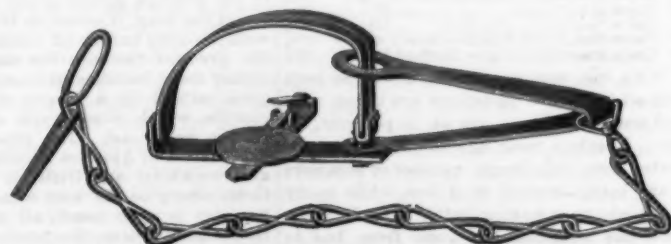
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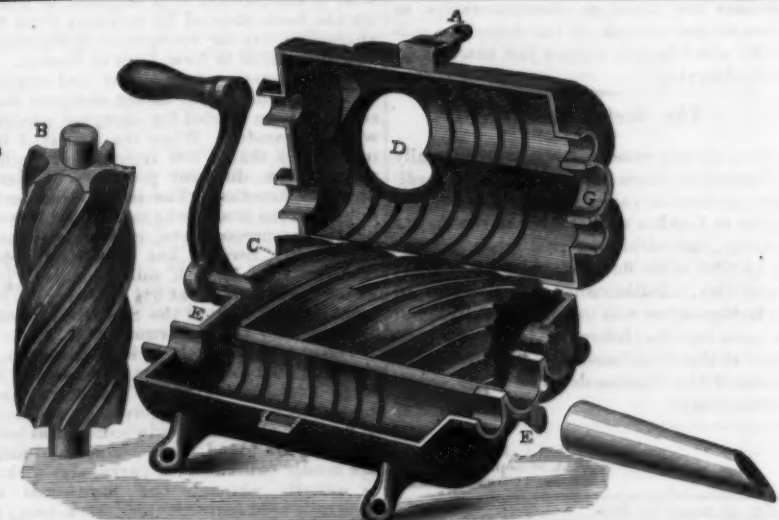
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Works Rapidly,  
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Sausage Stuffers.

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We have a good stock of all the above, and  
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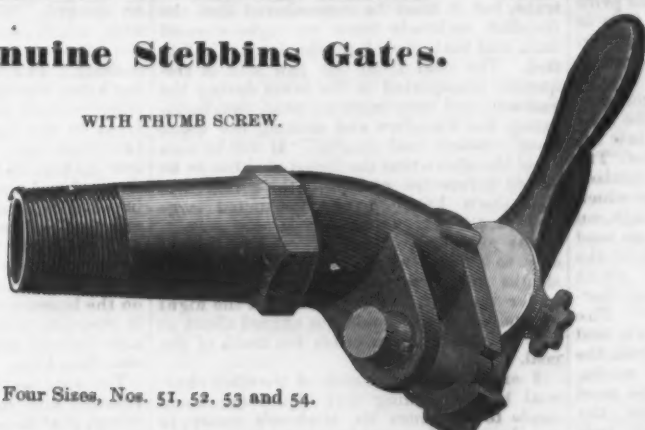
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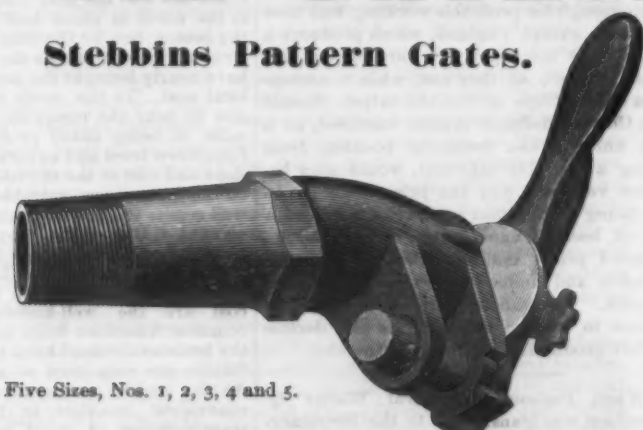
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WITH THUMB SCREW.



Four Sizes, Nos. 51, 52, 53 and 54.

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Five Sizes, Nos. 1, 2, 3, 4 and 5.

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## Hardware Manufacturers.

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## Hardware Specialties.

Amidon & White, Buffalo, N. Y. 38  
Andrews Thos. J., Philadelphia, Pa. 34

## Hinges.

Moore



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 1 Mill, 6 x 30 in. Cylinder Boiler, 2d-hand.  
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to, situated at Easton, Pa. (about 75 miles from New York), consisting of all the Buildings, Machinery, Engine, Lock Patterns, Dies, &c. These works have been in successful operation up to the

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death of one of the partners of the Boston Rock Manufacturing Co., is the cause of the works shutting down. Here is a business already established and ready to commence operations at once, as all the machinery is in good working order. For

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## For Sale.

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The undersigned offers for sale the Buildings, Tools, Machinery, Patterns, &c., &c., belonging to the company, consisting of Hot-Punched Nut Machines, Washer Machines, Compound Punches

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and Shears, "Burdick's" Bolt Header, "Abb's"  
Bolt Headers, Upset Machine, "Schlenker"  
Pressing Machines, Lathes, Planers, Drill  
Presses, Blacksmiths' Tools, &c. &c., all in com-  
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WM. H. STONE,  
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WM. H. STONE,  
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The Stock and Fixtures of a retail Hardware Store in Ansonia, Conn.; inventory from \$2000 to \$10,000; stock clean. For particulars inquire  
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# Trade Report.

## Philadelphia.

Office of The Iron Age, 220 South Fourth St.,  
PHILADELPHIA, October 28, 1884.

**Pig Iron.**—There is but little change to report in the Iron trade, the demand having been limited to small lots for immediate use. This policy has prevailed for some time past, and is likely to prevail so long as uncertainty in regard to the future continues. The volume of business has shown some little increase, however, during the past few days, and, judging from the number of inquiries that have been made, prospects are somewhat more favorable for the near future. Stocks have been reduced to the lowest possible limits, and to keep moving at all, purchases of material have to be made, even though it may be in small quantities. This point was reached some time ago with the majority of consumers, and now it is no doubt universally the case that every order that comes in has to be met with a proportionate purchase of Pig Iron. Hence it may be inferred that the demand will be at least in proportion to consumption, and, if confidence in values is sufficiently restored, it may be more, and doubtless will be more, as soon as prices begin to show a hardening tendency. In the meantime the general condition of business is such as to preclude the probability of any material change in the near future. There is a possibility, of course, that in case of a Republican success things might take a sudden start. Many importance enterprises which have been held in abeyance for some time might be set in operation, and these would set others in motion, and, although the probabilities of such an event are not great, the contingency is one not to be altogether ignored. There are contracts already closed of very considerable importance in the aggregate, but work has not been commenced, and may not be for weeks, perhaps not for months; but in any case it is only a question of time. There is a basis, therefore, for very considerable activity, providing things once take a start, and it would not be safe to make predictions without taking this into account. Meanwhile, and until after the elections, no change whatever need be expected. Small sales are the rule and at about last week's figures. The tone of the market has been dull and heavy, but in spite of that prices have been fairly maintained. No. 1 Foundry has been taken at from \$19 to \$20 at tide, or its equivalent; No. 2 at \$18 @ \$18.50, and Gray Forge at \$16.50 @ \$17, according to brand, quantity, &c. There has been more irregularity on the low-priced Irons than on standard or fancy brands, and when sales have been forced prices have had to suffer in proportion. For carload or 50 to 100 ton lots the rates quoted have been realized without much difficulty, but beyond that the market will not stand much pressure. Some good-sized lots of low-grade Iron have been inquired for by Pipe foundries, and sales of several thousand tons are likely to be made, but at low figures.

**Foreign Iron.**—Nothing doing at present, and no inquiries likely to lead to business. Bessemer, nominally \$19 @ 19.50, and for special brands \$21 @ \$21.50. Latest sales Spiegel were at \$28 for 25 %, \$26 for 20 %, with further offerings at \$26.50 for 20 %, and \$23 for 10 @ 12 %.

**Blooms.**—Demand somewhat less active, and prices easier, although still quoted as before: Charcoal Blooms at \$52 @ \$53; Run-out Anthracite, \$43; Scrap Blooms, \$38; Northern Ore Blooms, \$35.

**Muck Bars.**—Demand slow, and sales in quantity difficult to effect. Prices irregular, with \$28 @ \$29 at mill asked, according to location and quality of Bars.

**Bar Iron.**—There is nothing of interest to report in the Bar trade, business being as before. There are no indications of improvement, and such orders as are offered are for small lots for immediate delivery. The depression in business is strongly reflected in the scarcity of demand for Finished Iron, showing that consumption has been seriously curtailed. Prices are irregular, and more or less demoralized, although 1 5/8 @ 1.95 is still quoted for Best Refined Iron, but lower figures could be had on large orders or desirable specifications. Medium and low qualities from 1.65 upward.

**Plate and Tank Iron.**—A slight improvement is noticeable for small lots, but there is nothing like general activity. Some of the best-known mills are kept fully employed on small orders for the higher grades of Plate, but there is no inquiry whatever for large lots of Common Iron. Shipbuilding is duller than it has been for years, and the lack of demand from this source is severely felt. Tank Iron is also very dull, and, with nothing to offset the loss of demand from these interests, business cannot be anything but unsatisfactory. Prices are unchanged, as follows: Plate Iron, 2.15; Tank, 2.15 @ 2.25; Shell, 2.75; Flange, 3.75; Fire-Box, 4.25; Steel Plates, Flange, 3.55 @ 3.75; Fire-Box, 4.25.

**Structural Iron.**—The demand has been confined to small lots, and the large contracts taken by leading companies are still held in abeyance. There is not as much scarcity of business as appearances indicate, but delays of one kind or another keep work back,

so that at the moment there is really very little to go on with, notwithstanding the fact of large orders being on the books. Temporarily there is a considerable scarcity of business, and how long it will be before work will be commenced on a large scale is purely a matter of conjecture. The Phoenix Iron Company have a large amount of Elevated Railway work on their books, besides some thousands of tons of Bridge work, but owing to delays they still have plenty of room for early deliveries. Prices are about as last quoted, viz.: 2.15 for Angles, 2.25 for Bridge Plate, 2.75 for T's and 3.55 for Beams and Channels, subject to the usual discount on large lots.

**Sheet Iron.**—There is very little doing at present. Only small quantities are taken as needed, and the total of business is light. Prices for small lots of best makes remain as last quoted, viz.:

Best Refined, Nos. 26, 27 and 28..... 4 1/2  
Best Refined, Nos. 18 to 25..... 3 1/2  
Common, 1/4 less than the above..... 6 1/2  
Best Bloom Sheets, Nos. 26 to 28..... 6 1/2  
Best Bloom Sheets, Nos. 18 to 21..... 5 1/2  
Common Red Plates, 3-16 to 18..... 3 1/2  
Blue Annealed..... 2 1/2  
Best Bloom, Galvanized, discount..... 5 1/2  
Second quality, discount..... 5 1/2  
Common, discount..... 5 1/2

**Wrought-Iron Pipe.**—The demand for small lots is fair, but outside of this there is very little doing. The collapse of the Empire Iron Works, as the combination was called, has had no effect whatever upon trade here. Their discounts have been ignored for some time past, and no one appears to have been bound by their regulations. Prices continue very irregular, buyers in many cases making their own terms. Under these circumstances it is difficult to quote with accuracy. Nominally, however, discounts are as follows: Butt-Welded Black Pipe, 45 %; Butt-Welded Galvanized, 30 @ 35 %; Lap-Welded Black, 60 @ 65 %; Galvanized, 40 @ 45 %; Boiler Tubes, 60 %.

**Steel Rails.**—The position shows no material change, and the market may be called steady at last week's prices. There is a considerable amount of business in sight, but there is no special anxiety on either side to enter into very extended engagements. Lots of a few hundred to 2000 or 3000 tons each are inquired for, and at \$27.50 @ \$28 prices are firm, with a trifle over \$28 asked for certain deliveries or when the lots are small. Appearances indicate a steady market at current rates, for the reason that most of the mills which are in operation are pretty well supplied with orders, while those that are idle are not likely to start in at prices which to them would probably be unremunerative. Hence, with a reasonable certainty of a demand fully equal to the capacity of mills now in active operation, there is every reason for the belief that the prices can be held at about the figures now quoted.

**Steel Blooms and Slabs.**—There is no change to notice, although there is considerable disparity in prices, due largely, however, to the variety of qualities offered. As a rule, quotations are as last quoted, viz.: Nail Blooms (Foreign), \$33 @ \$34 at tide, and \$37.50 @ \$39 for Soft Basic Blooms for special uses. Domestic Slabs are quoted from \$32.50 to \$35 at mill, according to quality.

**Old Rails.**—The market shows no special change, the demand being, as before, irregular and uncertain. Philadelphia deliveries are held at \$18, with buyers at about \$17.50, although small lots have been taken at full quotations. Sales at interior points have been made at \$19 @ \$19.50, according to deliveries, and at these figures the market may be called dull and steady.

**Scrap Iron.**—The demand is still confined to small lots, and to effect sales beyond that would be likely to result in lower prices. Sales chiefly at last week's figures, viz.: Choice No. 1 sells at \$19.50 @ \$20, f.o.b. cars, and ordinary qualities at \$18 @ \$19; Wrought Turnings at about \$15, and Cast, \$9.50 @ \$10.

**Nails.**—The demand continues fair, although nothing more than ordinary requirements are taken. Steel Nails are selling well at a slight advance over Iron. Prices continue unchanged, with possibly a trifle better feeling. General figures are \$2.10 @ \$2.15, according to circumstances.

## Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue,  
PITTSBURGH, PA., October 28, 1884.

There is continued complaint in business circles; both merchants and manufacturers are dissatisfied, and see little chance of improvement before spring. The labor question continues in an unsettled and unsatisfactory condition; scarcely a day passes but a hitch is reported between employer and employed, and strikes are still of common occurrence. The Coal miners' strike in the Monongahela Valley, which was inaugurated early in the summer, still continues, although it is not likely to hold out much longer.

**Iron Ore.**—There is but little Ore wanted; the few furnaces in blast are buying very sparingly, and the indications are that this will be an exceedingly poor Ore market for some time to come. Advances from Cleveland continue of a most discouraging character.

**Pig Iron.**—There has been no important change in the situation during the week under review; business continues dull. Consumers, as a rule, are still refusing to buy beyond immediate wants, although producers

are just as indifferent about selling. Production is being reduced steadily, and in a regular and legitimate way, without the aid of the shut-down project, which for a time was pushed in certain quarters with considerable energy. Some operators look for an increased demand next month, while others do not expect a change in the situation until toward spring. Prices have undergone no quotable change here during the past 60 days, and, as cost of production has been reduced to lowest possible limit and there is no margin at present rates, it is thought the next change will be upward, although there is not much prospect of an advance at present. There is a rumor of a lot of Southern Mill Iron having been sold, to arrive by river on the resumption of navigation, at \$15, four months, but it lacks confirmation. As a rule, consumers here are very chary about taking hold of an Iron that they know nothing about; indeed, most of them prefer to pay the difference for the product of home furnaces which they have been using and are familiar with; quality is looked at as well as price. Quotations may be given as follows:

No. 1 Foundry.....\$19.00 @ \$20.00, 4 mos.  
No. 2 Foundry.....17.50 @ 18.50, 4 "  
Extra Foundry.....21.00 @ 21.50, 4 "  
Neutral Gray Forge.....16.00 @ 16.50, 4 "  
White and Notched.....14.50 @ 15.00, 4 "  
All-Ore Mill.....17.50 @ 18.00, 4 "  
Charcoal, Warm-Blast.....21.00 @ 24.00, 4 "  
Charcoal, Cold-Blast.....25.00 @ 27.50, 4 "  
Bessemer Iron.....18.50 @ 19.00, 4 "

We can report sales of Gray Forge Neutral at \$16 @ \$16.50, four months; Bessemer at \$18, cash, and Cold-Blast Charcoal at \$27, cash, and \$27.50, four months.

**Muck Bar.**—The last sale reported was at \$27.50, cash, but \$28, cash, is the general asking price, and there are but few sellers below the last-named rate.

**Manufactured Iron.**—The general position of the market remains unchanged; orders continue to come forward sparingly for the season, and but few of the mills are running full. It is rumored that Painter & Son will start up shortly on Cotton Ties. The firm in question for many years made a specialty of Ties. Wm. Clark & Son, of the Solar Iron Works, have been working for several weeks on Ties, and it is encouraging to know that our American manufacturers have succeeded in taking this Cotton-Tie trade from English competitors. Several of the mills are working on Pipe Iron, including two mills of Graff, Bennett & Co., and the Keystone. The regular trade continues dull, and prices are still quoted at 1 5/8 @ 1.75, 60 days, 2 % off for cash.

**Nails.**—There has been no important change in the general position of the market for several weeks; orders continue small, demonstrating an expectation on the part of buyers of lower prices, but there is a very fair business in the aggregate. We continue to quote at \$2, 60 days, 2 % off for cash, in car lots, and 5 @ 10¢ per keg additional in a jobbing way. Steel Nails, 15¢ per keg higher. The feeling still appears to be gaining ground that the latter are destined before long to supersede the former. Prices are about the same at Wheeling as in Pittsburgh.

**Wrought-Iron Pipe.**—The most important event of the week was the meeting of the Pipe manufacturers, although nothing definite was accomplished. One of the main objects of the meeting was to get out a new price list, but this was not accomplished. The meeting, which lasted two days, adjourned to meet in New York. Prices are quoted as before, and our quotations are based on the last combination list, which is still quoted by all the Pipe firms, with the exception of Byers & Co., of this city, and Crane & Co., of Chicago, who have issued the list used prior to the adoption of the last combination list. Discounts on Black Butt-Welded Pipe, 40 % @ 45 %; Galvanized, do., 30 % @ 35 %; Black Lap-Welded Pipe, 60 % @ 60 and 10 %; Galvanized, do., 40 % @ 45 %. Selected Pipe or Pipe cut to specified lengths, discount 5 % less than rates above quoted. Discounts for Boiler Tubes, 5 1/2 % @ 60 %. Two-inch Oil Well Casing, 12¢ per foot, net; 5 1/2-inch Oil Well Tubing, 40¢ per foot, net.

**Steel Rails.**—There have been no sales reported here recently, in the absence of which we continue to quote \$28 @ \$29, cash, at mill.

**Old Iron Rails.**—There does not appear to be much doing, and in the absence of sales we continue to quote at \$19 @ \$20, according to quality, delivery, &c.

**Old Steel Rails.**—Mixed lots are still quoted at \$17 @ \$18 per gross ton and very dull.

**Steel.**—The general Steel trade continues dull and prices are weak, but without quotable change. Steel Nail Slabs are still quoted at \$31 @ \$32 per ton, but consumers expect to be able to buy them for \$30 before long. It is claimed that these Slabs are as cheap at \$30 as Iron Muck Bar at \$28 for making Nails.

**Railway Track Supplies.**—Everything in this line continues very dull, with but little prospect of improvement before next spring. Prices unchanged. Spikes, 2¢, 30 days; Splice Bars, 1.6¢ @ 1.7¢; Track Bolts, 2 1/2¢ @ 2 3/4¢ per lb.

**Scrap.**—No. 1 Wrought is quoted at \$17.50 @ \$18 per net ton; Wrought Turnings, \$14 @ \$15; Car Axles, \$25 @ \$26; Old Car Wheels, \$16 @ \$17, gross ton; Cast Borings, \$12 @ \$12.50, gross.

**Crop Ends.**—Are still quoted nominally at \$17.50 @ \$18, gross ton.

## Chicago.

Office of The Iron Age, 36 and 38 Clark St.,  
Cor. Lake St., CHICAGO, October 27, 1884.

**Hardware.**—The market for Hardware during the past week has been very quiet, though the cold snap that occurred about the middle of the week considerably improved the demand for specialties, such as Elbows, Stove-Pipe, Coal Hods, &c. The demand for Grain Shovels and Light Chains was a little better also than the week previous. In Shelf Hardware there is little doing. Cutlery shows some signs of improvement, but the apathy in the whole line of business is so far-reaching that an improvement in any particular line is small and scarcely worth noticing. Campaign Torches and Fixtures have had a good run during the last two weeks. Nightly meetings of some sort have made a profitable trade for those who have given special attention to this line, but the circumstances that benefited this class of trade have destroyed business of every other description. There is nothing to change this state of affairs for two weeks to come, with the chance of a still more quiet market before election takes place. During the week there has not been any material change in price, and no change that could be made would induce retailers to buy goods that they do not need.

**Barb Wire.**—The situation of the Barb-Wire market is in about the same condition as it was a week ago. The failure of manufacturers to form an association to regulate the production and price has, if anything, become more certain, and consumers, realizing this fact, are less inclined to purchase Wire at present prices than they were when the matter was first spoken of. There is nothing to encourage higher prices, and for the present the market gives indications of weakness. Galvanized Wire is quoted at 5 1/2¢ and Painted at 4 1/2¢, without regard to quantity, while lots ranging up to carloads can be had at 1/2¢ discount on these prices, and perhaps more to the best trade. Reports are in circulation that there is considerable accumulation of Wire in the hands of manufacturers, some of whom are disposed to place their stock on the market. Should they do so, there is no question but that lower prices will prevail before the season's business closes.

**Nails.**—Considering the condition of the market for other lines of Hardware, there is a pretty fair demand for Nails in a small way. Carload orders are difficult to secure. Buying in quantities of this size is unusual, and when orders are placed special prices are usually made. In a small way from store we continue to quote \$2.15 @ \$2.20 for Pittsburgh and Wheeling, while there are Nails of other makes upon the market that can be had at a fraction below these figures. Many of our jobbers have on hand light stocks of Steel Nails, which vary in price according to the make. Jobbers report Riverside Nails at \$2.30, and other brands are quoted as low as \$2.20 in small lots from store.

**American Pig Iron.**—The market during the week has been even more quiet than the previous one. Consumers of Pig Iron uniformly proclaim that they will not buy until after the election, and no offer that could be made on the part of the sales agent could induce them to place orders for Iron that they are not in need of. Trade under the circumstances has been very dull in carload orders. An exceptional inquiry for lots of 100 tons and one of 2000 tons came to our notice within the past week. Inquiries of this character come only from such consumers as must have the Iron, and who believe that any change which will occur in prices will be of an upward tendency. Furnacemen, upon the other hand, claim that they are not desirous of forcing their stock upon the market, and, as a rule, will not book orders beyond February 1, and many refuse to go beyond the last day of December. The quietness in trade does not affect the firmness of the market. Sales agents are not more willing to make concessions than they were several weeks ago. In a general way, prices are steady. The bulk of Charcoal Iron in the market is produced by a limited number of furnaces, who are so situated that they feel certain of being able to control the price for the present. Lake Superior Coke, Ohio Mixed and Standard Black Band Irons are also in good shape, and prices without change. The makers of Southern Iron are claiming higher prices for Nos. 1 and 2 than we quote, but, while the market is steady at these quotations, there is no doubt that No. 2 can be had in abundance at quotations, and perhaps less. The limited quantity of No. 1 that is brought to this market makes quotations firm, and these are likely to be the lowest figures that would be expected by any of the makers of first-class brands. This condition of the market is likely to prevail for the next two weeks, and even less trade is expected. We make the following quotations in carload lots, four months: Lake Superior Charcoal, Nos. 1, 2 and 3, \$21.50; Nos. 4, 5 and 6 @ \$22; Lake Superior Coke at \$20; Lake Superior and Ohio, mixed, at \$20 @ \$21; Ohio Standard Black Band, No. 1, at \$21; Southern, No. 1, at \$18.50; No. 2 at \$17.50; Silvery Soft at \$17.50 @ \$19.50; Anthracite, No. 1, at \$21, and No. 2 at \$20.

**Scotch Iron.**—While the market for Scotch Iron is very quiet, prices are somewhat firmer than several weeks ago. The stocks in this market are very light, and dealers have decided not to import a further supply before next spring. What is on hand will be amply sufficient, unless some unfore-

seen change occurs. In this event higher prices will be obtained. We make the following quotations for present delivery: Summerlee, \$25.50, cash, from yard, and \$24.50 to arrive; Glengarnock, \$25.50 from yard, and \$24 to arrive.

**Merchant Steel.**—There is nothing new to report in the demand or character of the market for Merchant Steel. Prices continue weak and irregular, and makers seem anxious to obtain orders, making concessions when necessary in order to secure them. "Crescent" brands are reported firm at present prices, and no further concessions are expected. Some makers claim to have enough orders on hand to keep them running for several months, while there are others who are only running on part time. We continue the following quotations for best refined from store:

Best Refined Cast Tool Steel..... Per pound.  
Crucible Cast Machinery Steel..... 5 1/2 @ 5 3/4  
Open-Hearth and Bessemer Steel..... 3 @ 3 1/2  
Open-Hearth Spring Steel..... 3 1/4 @ 3 1/2  
Tool-Cut Steel..... 3 1/4 @ 3 1/2  
Fire-Box and Boiler Steel..... 4 1/4 @ 5 1/2  
Syndicate Steel..... 7 @ 7 1/2

**Steel Rails.**—The demand in this market during the past week has been very light. For such inquiries as have been made \$29 @ \$30 is given as a fair quotation, though it is possible that this quotation would be only nominal if an opportunity were offered to secure a good round lot. The unsettled condition of the market excludes all transactions that can be deferred. Makers are of the opinion that some large orders will be placed as soon as these conditions are more favorable and the political excitement has passed away.

**Old Rails.**—Old Rails are rather scarce in this market at present. Railroads and brokers that have them are holding for higher prices, and are asking about \$19 per ton. Mills are quoting \$17.50 @ \$18, according to point of delivery and quantity. Several sales of small lots have been reported during the past week at these figures.

**Structural Iron.**—The market for Structural Iron seems to be at a standstill. There have been no new orders during the week, and there is not likely to be for several weeks to come. The demand from store has fallen off very materially, and the only class of trade in prospect would be under special contract. We continue the following quotations, with 1/2¢ @ 1/2¢ added for delivery from stock: Beams, \$3.60; Channels, \$3.60; T Iron, \$3; Angle Iron, \$2.50; Flitch Plates, \$2.50; Frieze Plates, \$2.70.

**Bar Iron.**—The market for Bar Iron during the past week was very quiet. We continue to quote Best Refined New Puddled, \$1.85 @ \$1.90 in a small way, while concessions of 5¢ @ 10¢ are made on desirable orders. Common Iron is still quoted at \$1.70 @ \$1.80 from store, while prices from mill are irregular and weak. Some of the Bar, Plate and Hoop mills report that they are well supplied with orders, and are not anxious to book further contracts at prices now prevailing. One or two out of the number have stated that they are refusing orders at cash prices, because they are of the opinion that they will obtain better figures before their present stock of orders is exhausted.

**Norway Bars.**—We continue to quote Merchant trade \$3.75 for small to medium-sized lots. Good-sized orders would likely be accepted at a fraction less. The 4¢ rate to consumers is unchanged.

**Galvanized Iron.**—Jobbers and dealers in Galvanized Iron report an exceedingly light trade for the week, and, so far as we can learn, there has been no change in quotations, which are as follows: Juniata, 55 % off; Charcoal, 57 % off, and Refined, 60 % off.

**Black Sheets.**—The makers of Black Sheets report better trade during the week than for several weeks past. The demand is largely for the heavier number intended for roofing and siding on buildings. In light numbers trade has been less active. Prices continue weak, and jobbers are supplied by mills at figures which would not have been accepted a month ago. Jobbers are pretty well supplied for the winter's trade, and makers are finding some difficulty in disposing of their stock. Jobbers report light trade from store at the following quotations: Nos. 10 to 14 at \$2.60 @ \$2.70; No. 16, \$2.80; No. 24 at \$2.80; Nos. 25 and 26 at \$2.90, and No. 27 at \$3.

**Old Wheels.**—There has been no demand for Old Wheels during the past week. The prices asked by those who have them and those offered by purchasers are so widely different that transactions are almost out of the question. Now and then when a foundryman needs a few for a special purpose he effects a sale by conceding to the demands of the holders, which are from \$18 to \$19. Prices quoted by foundries range from \$17 to \$17.50.

**Scrap Iron.**—Mills report that Scraps are offered them from every section of the country. Stocks have been piled up to an extraordinary extent in the yards of dealers, and in every direction the market gives evidence of more than can be disposed of. Mills are quoting \$15 @ \$16 for No. 1, and \$10.50 @ \$11 for No. 2. We make the following quotations as dealers' purchasing prices: No. 1 Wrought Scrap, per net ton, \$14.50; Cast Scrap, per net ton, \$12; No. 1 Stove-Plate Scrap, per net ton, \$3; Wrought Turnings, per ton, \$5; Cast-Iron Borings, \$6; Old Plow Steel, \$9; Tool Steel, per ton, \$15; Locomotive Steel Tire, per net ton, \$13; Buggy Springs, per net ton, \$14.50; Malleable Scrap, \$5.



and, while not quite so extensive, is  
less valuable in its line.



# Trade Report.

## General Hardware.

The engrossing interest which is taken this week in political affairs interferes seriously with the transaction of business, the volume of which has largely fallen off, leaving the market in a state of comparative stagnation. In this condition of affairs alterations in price are not to be expected, the market in this respect remaining, except as noted below, substantially as at our last report.

### STEEL GOODS.

A meeting of the manufacturers of Steel Goods was held in Buffalo last week, the primary object of which was to consider the question of Steel and Malleable Garden Rakes, with a view to so amend the discount as to protect the interests of the union against those of outside makers. The subject was thoroughly discussed by the members present and considerable correspondence was read before the meeting, all of which went to prove beyond a doubt that offers had been freely made, especially in the West and South, by outside parties, not only on Rakes, but also on Hoes and Forks, at very much below union prices, and the opinion seemed to prevail generally among those present that the interests of the union could best be protected by a reduction in the price of all goods named in the standard list. As the expression of this opinion the union, by unanimous action, increased the discount on all Steel Goods named in the standard list to 60 per cent. minimum, instead of 50 and 10, as before, and making 60 and 10 per cent. the maximum, instead of 60 per cent., as before. We have heard some expressions of regret from the trade that it was thought necessary to make this reduction in price, and some have expressed the opinion that in making it the union was unduly influenced by an apprehension of outside competition, which, in the judgment of the parties to whom we refer, was not sufficiently extensive to necessitate this change of price. To this question there are, however, two sides. The manufacturers of this line of goods were doubtless fully advised as to the facts in the case, and adopted a course of action similar to that which so many associations before them have followed in order to repress outside competition. It would be, doubtless, more for the interest of the manufacturers and the trade at large to have the present prices maintained than to have the higher figures nominally retained and then have the union go to pieces and prices become thoroughly demoralized.

In addition to this action regarding prices, and other business connected therewith, resolutions were adopted modifying slightly the rules of the association with reference to the delivery of goods.

We have heard from a number of manufacturers whose views have been of service to us in preparing this statement of the causes which led to the recent reduction in the prices of these goods. Nearly all refer to the change made as having been unquestionably the best, and a number of them indicate that there is a fair possibility that prices may later in the season be advanced to a higher figure. It is generally considered that the stability of the association is reasonably assured as a result of the action which has been taken, while fears have been freely expressed that if the price had been maintained where it was first fixed there would have been a break sooner or later.

In regard to this reduction one of the manufacturers writes us, referring to their action as making the margin between the prices of union manufacturers and those outside so small that union goods will be sold in preference to outside goods, and expressing the opinion that prices will be maintained until they are advanced. Another concern informs us that it was thought advisable to put the price where there was not so much chance for outside parties to operate, and expressing the opinion that this price will be adhered to, as outside parties cannot undersell it without drawing on their surplus. Another house describes the situation in this way: "The recent action of the Steel Goods Association was caused by the cutting of the combination prices by parties outside of the association. There has been among the members a firm adherence to the price. We tried the experiment by making a fair price, hoping to have it maintained. It was no sooner made than it was cut by outside makers. The present quotation leaves but a nominal margin to cut from, and the association felt that it would be better to sacrifice their profits to enable the manufacturers to maintain their price with a fair prospect of keeping their trade."

But, as giving a view of the market from the standpoint of a leading manufacturer, we lay before our readers the following extract from a communication relative to the reduction, of which we are just in receipt:

I favored the recent action of the Steel Goods union, and, consequently, I approve it. I felt that in view of the general depression in business, declines in prices and the quotation on these goods by a few agents of makers outside the union, we should stand on more solid ground to put union prices down pretty near to cost. With a capacity to produce these goods fully up to the country's demands, I did not think it policy for the union to promote the increase of outside factories. Yielding to the "times" and

the state of markets now, I believed we should stand in better shape to continue the union in the future, and avail ourselves of hoped-for improvement in prices and business, than if we had held to the prices of the August meeting. In short, I thought the union should do as an individual would do—go down when markets are down and up when the markets go up. Striking out the points of delivery on the Missouri River, I think to be a matter of simple justice to ourselves as manufacturers and to the jobbers at large, and look to see it secure a good-will toward and co-operation with the union from important quarters where the opposite disposition before existed. I think the Hoe and Fork Makers' union is to-day strong within itself, strong in the respect and confidence of the trade, and strong against all outside competition.

### BOLTS.

There is no improvement in the demand for Carriage and Machine Bolts, and, while the price for the best makes is pretty well maintained, the price for the common Bolts is so low that there can be but a narrow margin of profit to the manufacturers. Low quotations are undoubtedly made, but manufacturers are probably learning that low prices do not increase the consumption of goods.

The Association of the Manufacturers of Norway Iron Carriage and Tire Bolts have, we are informed, made a pool, the details of the arrangements not being made public, by which they expect to maintain the prices which they have determined for Norway Carriage Bolts. The association is said to embrace every manufacturer of Norway Carriage Bolts, large or small, in the country, and the discount from the new revised list, which we published last week, may be named as 75 per cent.

Russell, Burdall & Ward, Portchester, N. Y., have adopted, as we announced last week, the new revised list on Tire Bolts, but they still retain their former list on Carriage Bolts, their judgment being that it is the best Carriage Bolt list before the trade.

### NAILS.

There is but little change to note in the condition of the Nail trade. In most instances dealers report a steady continuance of the demand that has been noted for some time, with possibly an exception here and there in the direction of decreased business. The movement, however, is very fair in the aggregate, and exceeds the expectations of the members of the trade, who have latterly been anticipating a cessation of activity. The most important feature that has come to our knowledge this week is the reported canceling of contracts by a company which has been an active seller at low rates, the cancellation being due to a strike among their puddlers. The orders which they had taken have been placed among other parties in this vicinity, with the result of an unexpected demand for several thousand kegs beyond the ordinary requirements of the local trade. The export trade continues in tolerably good shape, small orders being quite numerous, with occasionally a call for a considerable quantity. Prices are steady on the basis of the quotations made last week, namely, \$2.10 to \$2.20 from New York store, the majority of sales being at \$2.15. We learn that several Eastern parties are experimenting with purchased Steel, with a view to turning their attention to Steel Nails in case the experiments prove satisfactory. No hope is entertained at present that Steel Nails can be manufactured cheaply enough to sell them for the same price as Iron Nails. This will be the case at probably no distant date, but thus far there is a difference in cost which has not been overcome.

### BARBED WIRE.

Nothing has occurred to change the condition of dullness noted under this head last week. A few sales have been made, it is true, but they have not been sufficient to impart any appearance of activity to the trade. The weakness of prices continues. Some of the sales made during the week have been subject to keen competition among sellers, resulting in the naming of lower figures than any heretofore realized. Quotations continue nominal on the basis of 5½ cents for Galvanized Four-Point, and 4½ cents for Painted, but these rates are shaded considerably for orders of any size.

### WASHITA STONE.

The following circular, which has been issued jointly by George Chase, 107th street and First Avenue, New York, and the A. F. Pike Manufacturing Company, Pike Station, N. H., will be interesting to our readers as relating to the quality, production and price of Washita Oil-Stone:

We beg to call your attention to the fact that we have arranged to control the entire production of all strictly good Washita Oil-Stone quarries. Years of experience and careful and thorough personal investigations recently made have proved to us that there are as yet discovered only three quarries capable of producing Washita Oil-Stone suitable for sharpening edge tools, and from these quarries only are produced the best quality of Stone of even grit, entirely free from hard spots and sand holes, and having a sharp, quick-cutting quality possessed by no other stone. By careful selections we believe we are able to offer Stones superior to any others found in the world. Every Stone we send out for best quality of No. 1 or extra will give excellent satisfaction. We have tried stones from the various quarries, hoping we might find something as good, for like all other things, the best quality is expensive to produce, but only Stone from these three quarries have proved satisfactory, the others being of little or no value for use on account of sand holes, hard spots and unevenness of grit. The manufacturers

of these poorer grades, first, by the use of bleaching acids, then drying them thoroughly, and finally filling up the sand holes with calcine plaster, make them appear all right to those not thoroughly posted in the business; but as soon as the oil or water is applied and the stones used, you discover that they are worthless. There have been stones sold during the past year, which were made from old, condemned stock, which has demoralized prices and put stone on the market that is entirely worthless; and every one knows there is nothing more useless than a poor whetstone, as we have been testing all the different kinds of Washita Stones quarried. We have a small stock of the poor Stone on hand, which we keep to meet the quality and prices of same kind made and sold by other parties, which we do not recommend and do not like to sell; but if any one wants it, our prices for this kind will be as low as the lowest, but we will call your special attention to the best qualities, which we guarantee to give entire satisfaction, and we quote for present only, as prices must soon rule higher for this grade:

	Cts. per lb.
Washita Stone, Extra, from best quarries	10 1/2
" " No. 1, " " "	14
" " No. 2, " " "	10
" Slips, No. 1, White, from best quarries	27

### We quote the poorer quality:

Washita Stone, Extra	11
" " No. 1	9
" " No. 2	7
" Slips, No. 1, assorted	18

We guarantee them to be as good as those offered you by other parties. The prices are net for both qualities. We have tried to make a plain statement of facts, so you can know what you are buying, and you will get from us just what you order. All previous prices are this day canceled. No orders for less than 100 pounds at these prices. Terms net, 30 days.

### MISCELLANEOUS PRICES.

The Rhode Island Horse Shoe Company, Providence, R. I., for whom Durrie & McCarthy are agents, 97 Chambers street, New York, are now putting on the market and prepared to ship promptly the new Calk which is described among the new goods on page 12. The prices are as follows: Dull oo, 7 cents; o to 5, 6½ cents; Sharp oo, 8 cents; o to 5, 7½ cents, net, per pound, f.o.b., Valley Falls, Ohio.

The advertisement among our Special Notices on page 21, in which the Manhattan Hardware Company announce reduced and net prices on their goods, will be of interest to our readers. They advise us that the system they have adopted of making these low net prices on all orders amounting to less than \$1000 has resulted in a substantial increase of their trade.

The Globe Scissors Sharpener, which is made by the Globe Manufacturing Company, 926 Walnut street, Philadelphia, and illustrated among our Hardware Novelties on page 31, is sold as follows:

	Per doz.
No. 1	\$4.00
No. 2	4.30

subject to a discount of 25 per cent. The following are the prices of the Globe Radiant Heat, Gas and Stove Toaster, made by the same parties, and illustrated as above, the list being subject to a discount of 20 per cent.:

Gas Burner Toaster, No. 1	\$10.50
Gas Stove Toaster, No. 2	4.80
Coal Range Toaster, No. 3	4.30

Their Combined Detachable-Handle Tack Puller, Hammer, &c., also illustrated among the new goods, is sold as follows: Plain, per gross, \$21.60; Bronzed, per gross, \$23; subject to a discount of 20 and 5 per cent. All the above prices are subject to an additional discount of 4 per cent. for cash in 10 days, or 2 per cent. for cash in 30 days.

### ITEMS.

The Dayton Screw Company, Dayton, Ohio, have just completed 17 new Shavers in addition to their regular plant, and also, we are advised, have under way 50 new Threaders, which, with their machinery in process of manufacture, will increase their capacity to nearly 8000 gross per day. They are thus energetically prosecuting the manufacture of Screws, and meeting also the prices of competing companies.

We have received a letter from the Geneva Tool Company, manufacturers of Scythes, Snaths, Forks, Hoes, Rakes, Plows, &c., Geneva, Ohio, advising us that they have employed Samuel A. Haines as their selling agent, whose office, at 88 Chambers street, New York, will be supplied with a full set of samples of their goods, of which at all times he is authorized to name their best prices and terms for home and export trade. In this connection they also mention that, having largely increased facilities for the production of both Wood and Steel Goods of approved quality, and recognizing the popularity and extensive acquaintance of Mr. Haines, they are looking forward to a largely increased business.

John H. Graham & Co., 113 Chambers street, New York, have been appointed agents for the sale of the Nantasket Roller Skates, manufactured by the Nantasket Roller Skate Company, Lowell, Mass. The catalogue of these goods is also at hand, neatly illustrating the different styles, on which we are informed, John H. Graham & Co. are in a position to give the manufacturers' best terms, and thus make satisfactory prices to the trade.

The Syracuse Twist Drill Company, Syracuse, N. Y., whose advertisement appears on page 29, announce in a circular that they have completed the rebuilding of their factory upon the site of the one recently destroyed by fire, and with enlarged and improved facilities are again manufacturing their line of Drills for wood and metal.

### NEW CATALOGUES.

The Cincinnati Tin and Japan Company, Cincinnati, Ohio, importers and dealers in Tin Plate and Metals, Japanned, Plain and Stamped Ware and Tinners' Supplies, have issued a new catalogue of their goods. It comprises a line of Japanned Ware, Coal Vases, Water Coolers, Oil Tanks, Coal Hods, Stamped Ware, Tinners' Trimmings, &c. It is accompanied also with a discount sheet giving their prices on the whole line of goods. We have circulars also describing a stationary Baker's Lamp, which is designed to light the baker's oven, and which they describe as non-explosive, economical and giving a brilliant light. Another circular is devoted to their Rotary Churn, of which a description is given, and the advantages connected with the use of which are enumerated.

The Globe Manufacturing Company, 926 Walnut street, Philadelphia, have issued a catalogue of the line of Hardware Specialties the manufacture of which they have commenced. This company was organized and chartered on the 18th of March, 1884, and of it Rudolph M. Hunter is president and Homer A. Herr secretary and treasurer. In this catalogue they, for the first time address the trade, calling attention to their various patented specialties, alluding especially to their Combination Dipper, Weigher and Measurer, Scissors Sharpener, Ice-Breaker, Tourists' and Ladies' Lemon Squeezer, Regular Lemon Squeezer, Cake Mixers, Egg Beaters and other articles, some of which are illustrated among the Hardware Novelties on page 31. They express the opinion that their goods meet an actual want in Hardware Specialties, as many of them will have little, if any, competition. They are the sole owners of all the inventions illustrated in the catalogue, and intimate that they have a number of others, on the practical utility of which they are now experimenting.

### ARRANGEMENTS OF HARDWARE STORES.

In reply to the inquiries which appeared in these columns a few weeks ago, we are pleased to give our correspondents who desired the information, and to our readers generally, the suggestions which are contained in the following letter from a Hardware man in Ohio:

To the Editor of the Iron Age: In your issue of October 2 I notice an inquiry from "Hardware Man" in regard to arrangement of Hardware store. Some eight years ago I fitted up my present salesroom according to my idea, and, while during that time I have seen some parts that might be improved or changed to advantage, the main plan has proved very convenient and satisfactory. On one side at front of store I have a 12-foot showcase made flush with shelving and hung with glass doors, and used for display of carpenters' and other mechanics' Tools. The case can be lined with red cotton flannel, which looks neat and is inexpensive. To the rear and adjoining this case I have some 600 wood drawers or boxes of different sizes. I think 6 x 6 for Door Locks is the best size; for some Tools and other goods 5 x 7, 6 x 8 and 6 x 10 are convenient, and for Augur Bits, Augurs, Files, &c., 3 x 14 and 16 x 18 are used. Shelving and small drawers are 12 inches in depth. I have partitions running up and down 30 inches apart, and drawers slide on shelving side by side. For pulls I use Porcelain Knobs placed on lower edge of drawers. This position will enable drawer to pull out easily and give room for sampling of goods above the pull.

I do not agree with the communication signed "S. H. Green," in regard to finish of drawers. I have seen green-glazed paper used that looked well when first put on, but in the course of time commenced to peel off and show ragged edges where samples were changed, as they have to be frequently. I prefer bright green paint. Under the counter shelf large drawers can be used for articles too bulky to be sampled, and below this the space can be boxed and drop doors be used, thus protecting goods from dirt and dust that naturally accumulate from sweeping and dusting. For Nails I use what might be called a skeleton counter, partitions being put in about 18 inches apart, and bottom board placed on a bevel and projecting out, so that a scale scoop can be partly placed under the projection. Each bin of the size mentioned will hold a keg or more of Nails. On opposite side of store I have shelving for such goods as cannot easily be sampled. Shelving is all 12 inches deep, 8 inches apart and partitioned every 36 inches with turned walnut dividers. From floor to top of shelving and drawers is 7 feet. To reach much above this height would require a step-ladder, which is almost invariably in the way. I have utilized the vacant space that comes between top of shelving and ceiling by a balcony that extends on both sides and across back end of room. It is reached by a skeleton iron stairway on one side, placed directly over cellar stairway, so there is no room wasted. If there is anything I would have in a new store built just according to my idea of perfection it would be such an arrangement: it's as "handy as a pocket in a shirt," and is more available than a second story, besides utilizing room that can be well spared with our present system of high ceilings. The balcony should be about 4 feet wide, 5 inches thick, and ceiled with 3-inch lumber; it can be supported from above with iron rods fastened through joists. A neat wire railing on the outside, painted green or other bright color, will make it attractive. It can be shelved for surplus stock, or used for storing goods too bulky to be put on shelves. It is always desirable in any branch of merchandise to display as many goods and in as attractive a form as possible. Considerable taste can be shown in sampling goods on drawers. Condense similar lines together, but don't try to crowd too many samples on outside or goods inside of drawers. F. A. P.

The following communication has also been received, giving other suggestions and

going into practical details that will be valued by our Hardware readers. They will also be interested in the diagrams with which our correspondents have illustrated the outlines of their plan:

HOUSTON, TEXAS, October 13, 1884.

To the Editor of the Iron Age: In reply to the inquiry of "Indiana Hardware Man," we venture to give the writer's experience of over 22 years in the retail and wholesale Hardware business, under various circumstances, in different places, on the road and in the house. The accompanying sketches will assist in explaining our meaning. All Hardware shelves should be 15 inches deep, never less. The counter shelf or ledge never less than 12 or 15 inches. The shelves proper

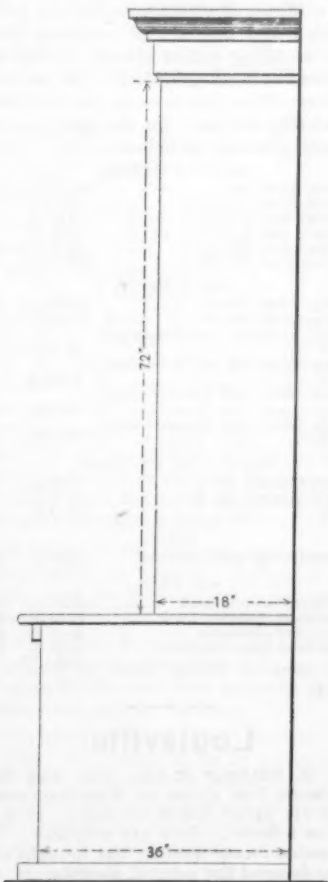


Fig. 1.—Sectional View of Shelving, with Measurements.

should be made movable (see sketch), between permanent uprights, 36 inches apart. Where immovable shelves are used the first shelf should be 10 or 11 inches above the counter or ledge, the entire length of the shelving. This space is a proper place for such goods as Butcher Knives, Shelf Brackets, Chisels, Gouges, Files, Wrenches, Hops and Staples, Razor Straps, Screw-Drivers, Augurs, Hammers, Hatchets and such other goods as are put up in long packages. Table Cutlery should be on first shelf, in front part of store, standing on end, label facing out,

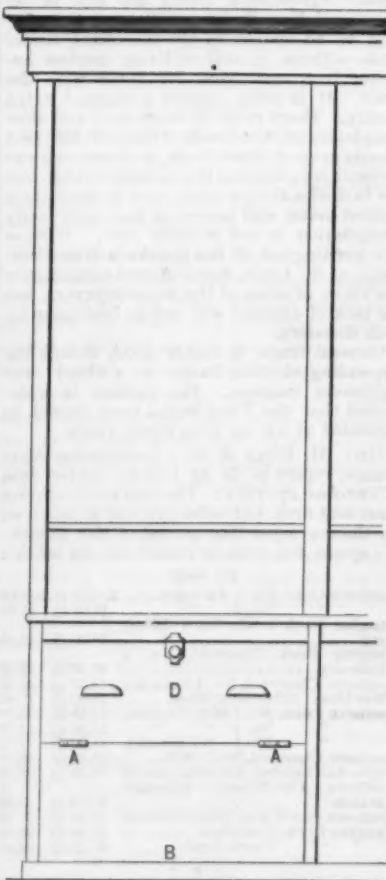


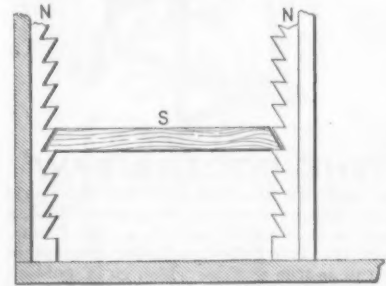
Fig. 2.—Front View, Showing Arrangement of Drop Lid.

requiring a space of about 11 inches high—all other shelves should be about 7 inches in the clear.

In most Hardware stores kindred lines of goods are scattered too much; for instance, Door Locks, Knobs, Door Bolts, &c., should be near each other. Screw Hooks and Eyes, Picture Nails, Cornice and Lamp Hooks, C. and H. Hooks, &c., should be together. Such goods as Cupboard and Transom Catches, Sash Fasteners and Lifts, Drawer Pulls, Drop Handles, Shutter Bars, Buttons, &c., should be together, and so on through the catalogue. All small goods, each one of which occupies no more than 4 x 4 inches space, should be neatly sampled on the end of a wooden box, covered with green paper; boxes should be made 1/4 or 1/2 inch thick, and



should measure  $4\frac{1}{2} \times 4\frac{1}{2}$  or  $5 \times 5 \times 12$  inches. For very small goods, such as Screw Eyes and Hooks, Drawer and Picture Knobs, Window-Spring Bolts, Saw Screws, &c., boxes  $4\frac{1}{2}$  or  $5 \times 2 \times 12$  inches will be found very convenient. All Hardware shelves should have a base shelf 3 inches from floor; this is a good place for Strap and T Hinges, Hook and Eye Hinges, Barn Door Hangers, Rollers and Rail, Well Wheels, G. S. Fixtures, Scythe Stones and such other goods as cannot be materially injured by an accumulation of dust or an occasional drop of water from the sprinkler. This should not occur, but the most stringent regulations cannot entirely prevent it. Under the counter shelf, in place of drawers, we use a drop lid (see sketch); this lid, when closed or up, protects the goods from dust and looks as though there were drawers. When goods are wanted, the lid is let down, and no ungainly box sticks out 10 or 12 inches to interfere with persons passing. All



S.—Shelf Stick or Support: should be about 1 inch wide and  $\frac{1}{4}$  or  $\frac{3}{8}$  inch thick and as long as the shelf is deep. It should be made of hardwood. N. N.—Notches at each end of dividing upright for Shelf Stick to rest on.

Fig. 3.—Method of Supporting Shelves.

Hardware men will fully appreciate this point if they use drawers under their counter shelf. Such goods as Chisels, Gouges, Wrenches, Augers, Auger Bits, Screw-Drivers, and nearly all goods in packages over 6 inches long, we never sample, but place in shelves, label end front.

Our ideas are probably claiming too much of your valuable space, especially as it is utterly impossible to describe, and prescribe, in an article like this, to suit all cases, because space at disposal, amount and kind of stock carried, would materially modify some of the above suggestions. The cardinal points, in our opinion, to make suitable Hardware shelves are depth of shelf and counter shelf; all else is subordinate to this. If possible, all Hardware shelves should be made movable. Before closing, we would call attention to one other very important item in a retail Hardware store, viz., a convenient way of handling Nails. A box on four sash rollers (see sketch for size and shape) we

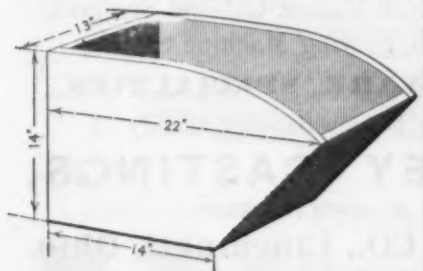


Fig. 4.—Nail Box, with Outside Measurements, to be Made of  $\frac{3}{8}$ -Inch or 1-Inch Lumber.

have found the most desirable way of handling Nails for retail. This box will contain 100 pounds. It can be pulled from under the counter, filled, emptied and kept clean, and is a great improvement over any other mode we know of.

E. H. RENISCH & Co.

## New York Iron Market.

The condition of business has been as unsatisfactory during the week just ended as for several weeks past, the demand being exceedingly slow in almost every line. Many orders are held in abeyance until after the Presidential election shall have taken place. Quite a number of consumers announce that they will be in the market early in November, or at furthest in December, if the result of the election suits them. Some very decided statements are made on this point, and it remains to be seen whether the predictions of an active trade in the event of the election of one candidate, or a still deeper depression in the case of the election of his opponent, will be realized. It is very certain, however, that the political contest is now exerting a much greater influence on business than was anticipated would be the case several months ago. It is not usual for a Presidential election to exercise so much effect on trade, but the present instance seems to be an exception. Prices show very little change, sellers being indisposed, under the circumstances, to make any attempt to force sales.

**American Pig.**—The transactions of the week have been very limited in number, and amount to a very small quantity in the aggregate. Sellers seem to take very little interest in business, manifesting indifference as to whether their customers take hold or not. They claim that prices are steady, being down now to the lowest point possible under existing conditions of manufacture, and it is impossible for them to offer inducements. They prefer not to endeavor to force business, and assume a waiting attitude. We have made some inquiry concerning the competition of Western and Southern Pig Irons with Eastern Irons in the New England market, and will summarize the replies which have thus far come to hand. One large foundry company writes us as follows: "We tried some No. 1 Vir-

ginia, but did not like it. Found it soft enough, but dirty. There are other Southern Irons being used here, and we know one party who, we understand, is using it altogether." Another large consumer of Pig Iron writes as follows: "I have been solicited for trade in Western and Southern Irons more or less for the past six months, but so far have bought only sample lots. I know that one of my neighbors has bought more freely than I, but think that the Stove-plate foundrymen have bought but little. Prices quoted me have been from \$21.50 to \$22.50, delivered at works or at Boston. The average freight from Hoboken or Perth Amboy to Boston on Pennsylvania Iron is \$1.50. With Lehigh Irons at \$20, the choice in my case would be in favor of the Lehigh. I should say that the proportion of Southern and Western Iron used was not one-third of the whole consumption in the East." A very large Stove manufacturer in Massachusetts says: "We have been making experiments during the past two years with Southern Iron, and have finally discovered a brand which works very nicely with Pennsylvania Irons that we can buy at from 50¢ to \$1 cheaper than the Pennsylvania brands of equal quality, and consequently we have been for the past year using Southern Iron for about one-third of our melt." Another large Pig-Iron consumer in Massachusetts writes as follows: "We have had Western and Southern Irons offered at very low prices, and have been tempted to use several brands, not only Charcoal Irons, but Coke Iron also. We have been well satisfied, and, as the price has been a little less than good Eastern Pennsylvania Irons, we shall continue to use them with prices relatively as now quoted. We have offered Cold-Blast Charcoal Wheel Iron delivered on wharf in Boston at \$24.75, and Charcoal Warm-Blast (800° or 900°) at \$20.75, same delivery." We shall, in the course of the next week or two, receive more complete information on this subject. So far as the local demand for Northern Irons is concerned, there seems to be no special weakness in any grade. Quotations of Standard North River and Lehigh Irons continue as follows, tidewater delivery: No. 1 X Foundry, \$19.50 @ \$20.50, with a few brands quoted at \$21; No. 2 X Foundry, \$18 @ \$19; Gray Forge, \$16.50 @ \$17.50. Outside brands sell at about \$1 below these quotations.

**Scotch Pig.**—The receipts during the past week were about the same as they have been for several weeks. The demand for forward delivery continues exceedingly light, most parties still purchasing from hand to mouth. Our quotations for small lots are as follows: Coltness, \$22 @ \$22.50; Gartsherrie, \$21 to arrive, \$22 from yard; Shotts, \$21.50 @ \$21.75 to arrive, \$22 from yard; Langloan, \$21.50 to arrive, \$22.50 from yard; Cambro, \$20.50 to arrive, \$21 from yard; Glengarnock, \$20.50 to arrive; Summerlee, \$21 to arrive; Dalmellington, \$21 to arrive; Eglinton, \$19.25 @ \$19.50 to arrive; Clyde, \$20 to arrive.

**Bessemer Pig and Spiegeleisen.**—Quotations for Foreign Bessemer are entirely nominal, with no sales reported and no inquiries on the market. Importers name \$18.50 @ \$19 as the probable rates, which might possibly be changed in some respects if there were any business in sight. The week has developed no new demand for Spiegeleisen, which is quoted at \$26 for 20%, with a possibility that a firm offer could be placed at something lower.

**Bar Iron.**—There is a limited demand for small lots of Bar Iron, which in the aggregate have amounted to sufficient business to put some of the mills which supply this market in a little better position than they have been. One company now state their orders will enable them to run their Bar mill full for 30 days, which is a rather gratifying fact to report. At the same time it must be noted that the demand is by no means general, and there are other establishments which are badly in need of orders and are offering Iron at fully as low prices as have been heretofore quoted. Common Bar Iron can be had in carload lots from dock at 1.55¢, and Best Refined at 1.85¢. Store trade is still inactive, with occasional concessions from quoted rates to best buyers. Nominal rates are as follows: Best Refined, at mill, 1.65¢ @ 2¢; from store, 2¢ @ 2.4¢; Common Iron, at mill, 1.45¢ @ 1.7¢; from store, 1.9¢ @ 2¢.

**Structural and Shaped Iron.**—Business has been very quiet during the week, and no developments in the way of new orders have come upon the market. Foreign competition is looming up in this line, particularly for Beams. Small lots have been sold here recently for shipment to points in the interior at prices considerably below the combination rates. Small lots are quoted as follows: Angles, from store, 2.3¢ @ 2.6¢; Tees, from store, 2.9¢ @ 3¢; Beams and Channels, on dock, 3.5¢.

**Plates.**—While the general demand has been light, a few good orders have been placed during the week. Some of the mills supplying this market report themselves in better shape now than has latterly been the case, and they are, consequently, a little firmer in their views. Quotations for small lots of Iron Plates are as follows: Common or Tank,  $2\frac{1}{4}$ ¢ @ 2.3¢; Refined,  $2\frac{1}{2}$ ¢; Shell,  $2\frac{3}{4}$ ¢; Flange,  $3\frac{1}{4}$ ¢; Extra Flange, 4¢ @  $4\frac{1}{4}$ ¢. For small lots of Steel Plates quotations are as follows: Tank,  $3\frac{1}{4}$ ¢ @ 4¢; Boiler,  $4\frac{1}{4}$ ¢ @  $5\frac{1}{4}$ ¢.

**Sheet Iron.**—There has been a fair business up to the beginning of the present week, but orders now are scarcer, and there is a probability that the demand will be very light for at least a week or two. Prices of Galvanized Iron are somewhat easier than they have been, owing to the disruption of the combination, but quotations are nominally unchanged from the rates heretofore given under this head. Prices of Black and Galvanized will be found in our list of New York Wholesale Prices.

**Merchant Steel.**—Business is very quiet, with no special change in price. Quotations continue about as follows: American Tool Steel,  $9\frac{1}{2}$ ¢; Tool Steel of special grades and finer quality, 12¢ @ 20¢; Crucible Machinery, 5¢ @ 6¢; Spring and Tire, 3¢ @  $3\frac{1}{4}$ ¢; Open-Hearth Machinery, 3¢ @  $3\frac{1}{4}$ ¢; Bessemer Machinery, 3¢; English Tool,  $14\frac{1}{2}$ ¢ @ 15¢.

**Steel Rails.**—While the business placed during the week has been of small proportions, 3000 tons being about the extent of the orders that have transpired, the better condition of the mills in respect to work secured inclines them to firmness in prices, and quotations now range from \$28 to \$30 for deliveries to suit the convenience of the manufacturers. There are inquiries on the market which may develop in considerable business if the views of buyers and sellers can be harmonized, but at present there seems to be a disposition on the part of railroad companies to withhold their orders in the hope that the firmness of manufacturers will be only temporary. This hope, however, may be delusive, as there is no doubt that the mills now in operation have all of them secured work for the winter months.

**Steel Wire Rods.**—The demand continues disappointing, no business of any consequence having been transacted recently. Sellers still ask from \$45 to \$46, according to time of delivery.

**Old Rails.**—We have been reported a sale of 1000 tons of Old T Rails at \$17, at Jersey City. This is the only transaction that has taken place in this vicinity, but negotiations have been progressing for quite a number of large lots of Rails, which, however, resulted in no business, the views of buyers and sellers being too far apart, and there being conditions of a special nature which have also interfered with sales. About 500 tons of Old Steel Rails sold at \$16.75 on the line of a railroad in Pennsylvania. More are offered at \$17, delivered at mill.

**Scrap Iron.**—The demand has been very quiet during the week, and we can hear of no sales. No. 1 Wrought Scrap from yard is quoted at \$19 @ \$20, according to location.

Business on the Metal Exchange has partaken of the general dullness, not a single transaction having been reported since our last issue.

## Coal.

Anthracite Coal looks better, from the sellers' standpoint. Under the policy of restriction the domestic sizes are becoming scarce, and Stove is hard to get. Another week's suspension at the collieries went into effect last night, with the object of hardening prices. Some dealers say they have more orders than they can fill. Already the alleged ruinous cutting among rival companies, which has produced demoralization for some time past, seems to have been almost wholly overcome. It is certain that prices are no longer dropping; although it would be bold to say that the full circular rates are always obtained. Steam Coals, or the sizes adapted to manufacturing, still drag, and sales in some cases are made at low figures.

Freights eastward are gradually stiffening, at an advance of 10¢ @ 15¢ per ton to Boston. Bituminous Coal is freely slaughtered, being without perceptible improvement, and prices are quoted \$3.10 @ \$3.50, f.o.b. in New York. The total amount of Anthracite mined thus far in the year 1884 is 22,985,124 tons, compared with 24,815,257 tons for the same period last year, a decrease of 1,830,133 tons. The total amount of Bituminous sent to the Eastern markets thus far in the year 1884 is 4,390,132 tons, compared with 4,000,633 tons for the corresponding period last year.

Among the events of the week was the charter of a schooner to take Coal from Mobile to Aspinwall for the Pacific Mail Steamship Company.

## Old Metals, Rags, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy.....	5.08 @	.....
" Light.....	.07 @	.....
Copper Bottoms.....	.06 @	.....
Yellow Metal.....	.06 @	.....
Brass, heavy.....	.06 @	.....
" Light.....	.05 @	.....
Composition, heavy.....	.08 @	.....
Lead, best.....	.023 @	.....
Tin Lead.....	.023 @	.....
Zinc.....	.023 @	.....
Pewter, No. 1.....	.19 @	.....
" No. 2.....	.08 @	.....
Wrought Iron.....	16.00 @	.....
Light.....	10.00 @	.....
Stove Plate Iron.....	10.00 @	.....
Machinery.....	12.00 @	12.50
Gate Bars.....	4.00 @	.....
Stereotype Plates.....	.04 @	.....
Electrotype.....	.034 @	.....
Small Type.....	.06 @	.034

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen.....	3.00 @ 4.00	.....
" Cotton.....	2.00 @ 3.00	.....
" No. 1.....	4.00 @ 4.50	.....
" No. 2.....	3.00 @ 3.50	.....
Seconds.....	1.00 @ 1.50	.....

Soft Woollens.....	4 @ 4.50	.....
Mixed Rags.....	1 1/2 @ 1 1/2	.....
Gunny Bagging.....	1 1/2 @ 1 1/2	.....
Gunny Butts.....	1 1/2 @ 1 1/2	.....
Kentucky Bagging.....	2 1/2 @ 2 1/2	.....
Book Stock.....	1 1/2 @ 1 1/2	.....
Newspapers.....	1 1/2 @ 1 1/2	.....
Waste Paper and Scraps.....	1 1/2 @ 1 1/2	.....
Kentucky Bale Rope.....	3 1/2 @ 4	.....

## Our Dormant Shipping Interests.

To the Editor of The Iron Age: The statement comes from Philadelphia that the four steamers belonging to the American line sailing from that port to Liverpool are to be sold to an English company. This removes the American flag from the last Transatlantic steamer, and probably ends all attempts to conduct this trade under our own flag so long as our navigation laws and the conditions remain as they are, and our Government refuses proper subsidies to these lines. The American Steamship Company, of Philadelphia, which has been operating these vessels, is almost exclusively owned, and is absolutely controlled, by the Pennsylvania Railroad Company. The line consists of four American ships sailing under American colors, and five British-built steamers sailing under British colors. The British vessels have steadily earned a profit, while the American ships have persistently failed to meet necessary expenses, and year by year the American Steamship Company have had to make good considerable deficit on these vessels. It is evident from this statement that the question of the original cost of the vessels had nothing to do with the failure of the line to make money, interest on the original cost being neither demanded nor expected. Nor can the failure of the American ships to pay expenses be explained by criticism of the management, as the management of both the British and American built ships was the same, and the British ships paid.

In explaining the cause of the failure of one of the officers of the line states that there are two reasons. In the first place, the construction of the American-built ships did not give as large a freight capacity as the English ships; consequently the latter, requiring only the same sized crew, could earn more in proportion to the running expenses. This, however, was only a question of construction, and could be easily remedied in building other vessels. But the second and chief reason for the failure was that the English vessels shipped their crews in Liverpool, which the American vessels could not legally do, and, as the wages paid the Liverpool seamen were much less than those paid the American, the running expenses of the ships were consequently much less. I think one other reason could have been given, and that is the difference in the methods and amount of taxation of capital invested in ships in the two countries.

The failure to operate vessels in this trade profitably under the American flag naturally suggests the question, What is the remedy? The first answer is, A just taxation in charges upon capital invested in steamships engaged in this trade, so that the charges in this country shall not exceed those paid upon English vessels engaged in similar trade. It is difficult to see how this point can be reached without co-operation between the National and State Governments. The State Governments have the portion of taxation upon property invested in these States, and wherever the home of the company owning these vessels is there the property of the company will be taxed. These rates of taxation vary in different States, and so great is the difference that vessels virtually owned in one State are registered and taxed in another where the rate of taxation is less than that where the owners of the vessels reside. American capital can, of course, be contributed to companies formed in other countries, and the vessels can be registered in these countries and taxes paid there, so that, so far as the employment of American capital in vessels is concerned, the problem is easily solved. But the problem is a more important one than this, and that is, How shall American capital be profitably invested in ships which fly the American flag? Under existing circumstances and conditions the only way out of the difficulty would seem to be a system of subsidies to vessels sailing under our own flag, these subsidies being, in a measure, equal to the difference in the running expenses growing out of the difference in wages, and perhaps for a while, until the lines are established, the difference in the freights received by reason of the less amount that would be carried at first. I do not believe that the people of this country are opposed to subsidies honestly given and honestly used. They do object to giving subsidies a large portion of which will be paid to lobbyists, and it is these payments to lobbyists which have stirred up so much opposition to subsidizing vessels. But to respectable subsidies given for a legitimate purpose and used only in furtherance of that purpose, it does not occur to me that the American people will be opposed.

New York, October 27, 1884.

## INDUSTRIAL ITEMS.

### MASSACHUSETTS.

The Geo. F. Blake Manufacturing Company, 44 Washington street, Boston, have received orders for the pumping engines for the town of Wellesley. The plant will consist of one duplex compound condensing engine having a capacity of 1,000,000 gallons in 24 hours, two boilers and all the machinery for a complete pumping apparatus.

### CONNECTICUT.

The old stove iron foundry in Crow Hollow, Meriden, which was one of the first foundries built in New England, and where W. M. Johnson used to melt pig iron that had to be brought from Middletown in ox teams, is to be converted into a veterinary hospital.

### NEW JERSEY.

It is reported that Philadelphia capitalists will build a very large window-glass factory at Slaterford, and that work upon it will be commenced this month.

The employees of Benj. Atha & Co.'s steel works, at Newark, numbering 150, have

been notified of a 10 per cent. reduction in wages. This is the second reduction of 10 per cent. within a year.

### PENNSYLVANIA.

A new nickel-plating works will soon be started at Lebanon.

A new glass works is projected at New Ringgold.

The Ahl Furnaces, at Boiling Springs, have been purchased by D. V. Ahl for \$70,000.

The firm of M. V. Smith & Co., that operated the Tyrone Forges, at Tyrone, Blair County, have been dissolved. Mr. Smith is now engaged in the profession of metallurgical engineering. The plant of the forges has been sold and the works will be dismantled.

Notice of a 10 per cent. reduction on all wages was posted at the Pottsville Iron and Steel Company's Fishback Rolling Mill, near Pottsville, on the 18th inst. The men have taken no action on the subject yet, but there is talk of striking. The mills, which are employed in the manufacture of bridge and building iron, shut down on the day mentioned, on account of the low prices and scarcity of orders. The reduction is to go into effect November 1.

### PITTSBURGH AND VICINITY.

Lucy Furnace No. 2 is now running to its utmost capacity. The employees feel enthusiastic and boastful over the heavy work the furnace has been doing, it being claimed that she is turning out more iron per day than any other furnace in the United States. As an inducement to the hands employed, they are given an increase of wages of 10 cents for every 10 tons over 170 per day, at which rate they make from 20 to 40 cents extra. An average taken of the iron turned out during the past two weeks shows a daily output of 225 tons.

Dilworth, Porter & Co. have erected a derrick on their mill property, South Side, and will commence drilling a well for gas in a few days.

### OHIO.

Steel nails from purchased slabs are being made at the factory of the Kelly Nail and Iron Company, Ironton.

Fayette Brown, receiver of Brown, Bonnell & Co., Youngstown, makes his report for September, as follows: Balance on hand for September 1, \$6805.71; receipts in September, \$105,683.80; disbursements, \$100,665.73, leaving a balance on September 30 of \$11,823.78.

Summers Bros. & Co., Struthers, have just received an order from the Plaquemine Lumber and Shingle Company, Plaquemine, La., which calls for band iron, nickel-plated, to be used for exposition purposes at the coming World's Fair at New Orleans, La.

### ILLINOIS.

Thomas C. Massey, manufacturer of the "E & K" instantaneous-grip vises, whose removal from Batavia to Chicago was announced a week or two since, informs us that his address at the latter place is 11-23 Jefferson street.

An order for a 75-horse-power Heine safety boiler of steel has been placed with Kroschell Brothers, of Chicago, by the Ernst Brothers Brewing Company.

The nail department of the Calumet Iron and Steel Company, at Cummings, is running full time.

The Atchison, Topeka and Santa Fé Railway has recently ordered from the Dean Steam Pump Company, through the Chicago house of the latter company, a duplex compound pumping engine having a capacity of 1,000,000 gallons daily, and which is subject to a constant pressure of 160 pounds.

The O'Connell Coal Company, of Joliet, have been incorporated, with a capital stock of \$10,000.

### INDIANA.

Cobb's Iron and Nail Company, at Aurora, have succeeded in engaging enough men to start their works. The former employees, numbering about 300, are still striking.

### MISSOURI.

A report from St. Louis states that on the 22d inst. the works of the Southern Barbed Wire Company were almost totally destroyed by fire. The loss on stock and machinery is about \$50,000; insurance, \$50,750. The loss on the building is \$7000; insurance, \$5000.

The St. Louis Stamping Company are running their Granite Iron Rolling Mills full force.

### WEST VIRGINIA.

Wheeling nail-makers have been on a strike against the system of requiring nailers to repair, at their own expense, any breakages that may occur in their machines. This has long been the rule in Wheeling, but has not obtained elsewhere. We understand that the difficulty has been amicably adjusted, though on what basis we do not know.

### ALABAMA.

The Amalgamated employees of the Birmingham Rolling Mill, Birmingham, have declared a strike against a 10 per cent. reduction. This was formerly one of the strongest Association mills in the country, and employed upward of 500 men.

### MARYLAND.

Detrick & Harvey, of Baltimore, are building a machine shop, 116 x 60, two stories high. It will be equipped with the best machinery, and is expected to be ready for starting up next winter. They examined many machine-shop structures, and concluded to adopt the plan followed by the Yale & Towne Manufacturing Company, Stamford, Conn. The shop will be well lighted, extra land having been secured, more than that covered by the building. The firm have improved their single-post iron planer and have brought out a new heavy milling machine.

### TEXAS.

The Marshall Car Wheel and Foundry Company, of Marshall, have contracted for a new building, 75 x 250 feet, to take the place of the structure recently burned. The new works will be larger than the old ones.





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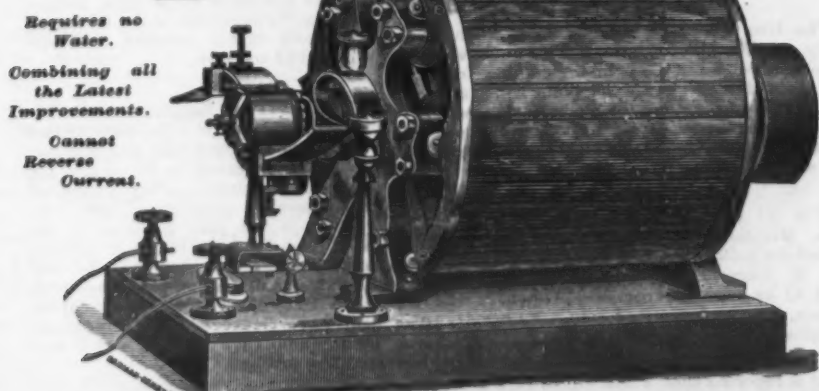
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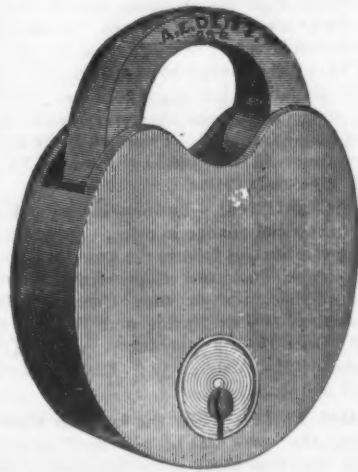
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have held their place against all comers, and are now the standard machines the world over. Since last year we have made FOUR great improvements on these saws—first, a new Rubber Blower, which gives as much blast as is desired; second, a new Clamp, tunnel-shaped, which guides the Saw to its place in the dark; third, a Roller inserted in the table at the back of the Saw, which makes it run as true as those which go in guides; fourth, a new Stretcher Rod, which gives the Saw a perfect adjustment.

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Forged Horse Nails.  
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HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST  
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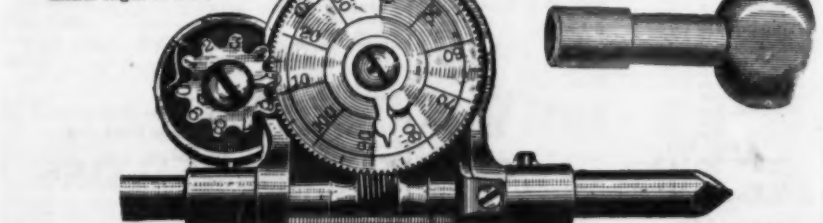
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The Most Popular Combination Tool in the Trade.  
Made in the most Thorough Manner, of the Best Material and Finish,  
By **TOWER & LYON,**  
96 Chambers Street, NEW YORK.

## English Letter.

(From Our Regular Correspondent.)  
LONDON, October 13, 1884.  
THE OUTLOOK

has not undergone any very important variations since my last letter, but I think it is better, rather than worse, on the whole. One swallow does not make a summer, I am well aware, but the single bird is a harbinger to be relied upon, and its fellows are sure to follow sooner or later. At present we are not quite certain whether we have seen the swallow; consequently, all vaticinations as to the future must be more or less unreliable. Some among us are beginning to swear by the good time coming, but the cautious ones decline to follow suit, and urge that nothing has transpired as yet of sufficient weight to lend adequate support to the free indulgence in optimism. If I were umpire I should incline to the views of the cautious gentlemen, and would strongly advise the adoption of a waiting game. As I have had occasion to remark previously, we are decidedly doing a little better in many departments, but the departure has nothing of the boom about it, and some of the change consists of promise rather than performance. Surely, therefore, we can afford to wait and let events evolve themselves, instead of trying to force things in an unnatural manner. If there are the foundations of a good coming demand we may rely upon its advent with the utmost certainty; whereas, if the foundation be absent or badly based, no amount of ingenuity or optimism will suffice to raise a satisfactory superstructure. The harvest has been a good one almost all over the world, but it is likely to be realized with exceptional slowness, inasmuch as the prices of wheat and other produce are so low that the farmers will hold as long they can before sending their stuff into the markets. A rush is very unlikely, therefore, but there is much likelihood of a steady stream, simply because few of the farmers anywhere will be able to withstand the whole of the winter without realizing. Then, again, your market will scarcely settle down after Presidential election on this side of Christmas; consequently, all the probabilities favor the opinion that 1884 will not see any great spurt.

### THE IRON MARKET

has been slightly steadier this week, partly in anticipation of the quarterly meetings, and, during the latter part of the week, owing to the improved tone displayed at those gatherings in certain departments of the trade. As I foreshadowed in my last week's report under this head, no official alteration has been made in the price of marked bars; indeed, it is evident that in the present condition of that branch of the iron trade no augmentation could have been reasonably made. These bars are greatly affected by the progress of steel, as well as by the competition of good unmarked iron, so that they can scarcely be strictly regarded as being the leading criterion of the state of trade. Generally speaking, business in metals seems to be rather better throughout the home trade, and the shipping season is at its height for the northern ports. Season orders are helping many of the hardware industries, and there is fair ground for the expectation that the remainder of the year will be characterized by a moderate degree of activity. At Glasgow there has been a tolerably good turnover in warrants, which have been rather weaker in value, closing at 41 7/8 p. ton. Scotch special brands are generally unaltered, but in one or two instances are obtainable at about 6d. p. ton under last week's rates. Shipments of Scotch pig are still below those of last year, but the make has been correspondingly reduced, and stocks are now about 7000 tons lower than they were at this date last year. At Middlesboro' there have been very few changes this week, No. 3 being nominally 36/6 @ 37 p. ton. The shipments are moderate only, and, as eight furnaces have been changed from hematite to Cleveland pig, there is little probability of any early advance in values. Hematite pigs on the West Coast are without animation, but quotations may be regarded as being nominally a shade steadier, at 43/ @ 44/6 for mixed lots, now that the production of these pigs in Cleveland and Scotland has been curtailed. In the other leading smelting districts pig iron is fairly steady, good qualities having been disposed of for delivery during the fourth quarter of the year. Heavy manufactured iron is dull. In wire rods more business is being done, and fencing wire is a little steadier. Galvanized sheets are also steady at the recent improvement in values. Ordinary finished iron has been neglected, save at the quarterly meetings. Old materials remain dull at last week's quotations, save that heavy wrought scrap is a trifle steadier in tone.

Freights are about as of late, pig iron from Glasgow to New York by ordinary steamer being 2/6 @ 3/ p. ton. As to Cardiff and Bristol Channel ports, Edwardes, Robertson & Co., say: "The low state of the freight market does not appear to be any inducement to extend their operations with the States, as compared with the month of August. The returns of the past month show a decline in quantities, notwithstanding the freight market ruled at a mere nominal rate, the room for weight being easily procured at about 8/6 p. ton. Inquiries are now made for superphosphate, Newport to Savannah; the rate at which room will be found for this may be put down at 8/ @ 9/ p. ton; there are no transactions other than this to be recorded for the Southern ports." Mr. W. Balchin reports: "Since the issue of my last circular freights to the principal Australian ports by steam have assumed a firmer tone, in consequence of the large parcels of fine and second goods now going forward to catch the Christmas markets, and the somewhat limited tonnage at present on the berth; rates are also well maintained by sail, ships getting fair cargoes to most ports. I am now informed that the two steam lines named in my last do not at present contemplate starting the new line of vessels from London to Australia, freights not being sufficiently remunerative to justify such a step. To the various ports in the United States and Canada a healthy competition is now going on by the different steam lines,

and merchandise is therefore going forward at rates much in favor of the shippers. To India, China and the Cape I have no material change in freights to report, the supply of tonnage, both steam and sail, being regulated by the demand."

Steel is without special features to note, with a medium turnover only at the majority of the works. In old railway leaf-spring steel the prevailing low prices are said to be causing some storing on the part of the dealers. For crop ends there is a better demand and the supply is short, owing to the continued dullness of the rail mills. Steel rails are steady, at recent association prices for rails of 30 lb p. yard and over. For lighter rails prices vary at the discretion of the makers. Some new orders are being given out, but short time is becoming almost universal. It is said that 40,000 tons have recently been ordered, but the report requires confirmation. Tin plates are about as last week—vide my remarks as to the quarterly meeting of the trade. Some interest is being taken here in the subject of guaranteeing plates for your market, but the Liverpool middlemen are naturally dead against any such radical departure.

### THE QUARTERLY MEETINGS.

At Middlesboro' on October 7 the quarterly meeting of the North of England iron and allied trades was held in the Royal Exchange. Contrary to general custom, there were no exhibits of any kind. The attendance was comparatively thin, and the tone of the market was depressed. Continued good shipments of pig iron from Middlesboro' are the only redeeming feature in the staple industry, but the season for heavy exports is rapidly drawing to a close and further restriction is talked about. At Wolverhampton on October 8 there was a fairly good attendance of buyers, and vendors were numerous. The chairman of the iron trade (Mr. Benjamin Hingley) announced that there would be no change upon the quarter's quotations. This leaves marked bars at £7. 10/ and the Round Oak brand at £8. 2/6. Shropshire all-mine pigs being 80/ for cold and 60/ for hot-blast qualities. Reports from the chief makers were to the effect that the marked-bar trade is rather dull, but that there is a little more doing in other descriptions of bars. Staffordshire bars of minimum quality were procurable at £5. 15/. Between that figure and £8. 2/6 prices are many, and indicate numerous grades of quality equally numerous. Ordinary bars were £6. 2/6, and plating bars £6. 10/, while bedstead angles were £6. 5/ @ £6. 7/6. The strip firms reported a better demand from the bedstead and the nail makers and quoted £5. 15/ @ £6 p. ton. Hoops were £6 @ £6. 10/, with a fair trade. Sheet-makers were occasionally in a position to refuse orders that were not offered upon favorable terms, since the thin sheet-makers in particular have the chief mills fully engaged. The progress of the steel-sheet movement was distinct, the demand for steel sheets for stamping and of tinned plates for canning meats being never so large. The working-up and the galvanizing sheet branch are both alike improved upon a few weeks ago. Since the middle of last month the improvement must be set down at from 2/6 to 5/, and occasionally 7/6 p. ton. Doubles for galvanizing were quoted £7. 7/6 @ £7. 17/6, and trebles, £8. 7/6 @ £8. 17/6. Certain Shropshire sheet firms quoted their singles at £7. 17/6, delivered Liverpool, and their doubles, £8. 7/6. Common wire rods for fencing were priced at £6. 7/6 @ £6. 10/ and £6. 12/6, delivered Liverpool. The Hollingswood Company, Limited, Wellington, reported themselves busy in sheets and wire rods; indeed, in Shropshire wire rods generally the last ten days has witnessed a decided revival.

At Birmingham on October 9th there was a much more cheerful feeling than at the previous quarterly meeting, though the attendance was scarcely so large. Two causes contributed to this result, viz., the partial recovery which has taken place within the last week or two in the price of common iron, and the intelligence, which rapidly spread through the meeting, that the colliers on the Worcester side of the district had abandoned the strike and had gone to work unconditionally on the terms of the arbitrator's award. Standard quotations were unchanged on the basis of £7. 10/ for bars, but that price is only secured by a few of the list houses, and the general quotation is nearer £7. Most of the sheet-workers reported themselves fully employed up to the year's end, and unwilling, therefore, to look at fresh orders except at an advance of from 5/ to 7/6 upon old prices, which were difficult to obtain. Some good orders for bars have been brought by the last two or three Australian mails, but, on the whole, the bar-makers are poorly off. The local consumptive demand, in connection with the tube, wire and iron foundry branches, is below the average. Pig iron was not in a very large demand, though several sales of 300 and 500 tons in a line were mentioned, and prices were practically the same as for the past two or three weeks. An influential meeting of the Galvanized Iron Trade Association was held at Birmingham the same day. An animated discussion took place on the position of trade, all the members present reporting that they were fully occupied and obtaining an advance on the prices ruling last quarter. From the amount of business offering and the increased prices of black sheets and spelter, higher rates may be expected. A quarterly meeting of the South Wales tin plate trade also was held at Birmingham on October 8, under the presidency of Mr. P. W. Flower, of Neath. It was reported that the exports of tin plates for the nine months ending September 30 amounted to 4,390,860 boxes, an increase of 267,800 boxes upon the corresponding period of last year. Stocks at the outports were, it was stated, about the same as they were three months ago. Current business was reported quiet, particularly from the United States; 15/ was named as the price of Welsh coke plates, and 18/ for Welsh charcoal plates.

### THE BOARD OF TRADE RETURNS

for September show that the total value of our exports was £20,505,945, as compared with £20,495,494 in the same month of last year, thus showing a slight increase. The imports were of the value of £32,249,596,

against £32,307,465 in September, 1883. The quantity of iron and steel exported last month was 309,704 tons, valued at £2,003,167, as against 367,361 tons and £2,465,843 in the same month of 1883. For the nine months of this year the total value of our exports was £176,969,097, against £179,665,085 in the same period of 1883.

### THE PRINCIPAL EXPORTS TO THE UNITED STATES COMPRISED

Article.	Month of September, 1884.	Month of September, 1883.	Month of August, 1884.
Alkali.....cwt.	336,286	285,040	193,618
Hardware & cutlery..£	24,800	30,479	27,372
Iron—Pig.....tons	15,094	30,819	21,386
Bar, angle, rod, &c. tons.....	249	1,101	631
Railroad, all.....tons	33	6,821	1,253
Hoops, sheets, plates &c.....tons	1,109	1,809	4,778
Tin plates.....	18,371	21,300	15,544
Cast or wrought.....	304	362	359
Old.....	3,397	2,015	952
Steel unwrought.....	1,482	966	865
Lead, all sorts.....	76	56	72
Steam engines.....£	1,129	4,159	3,089
Other machinery, &c.£	24,142	28,216	30,503
Tin, unwrought.....cwt.	30	341	201
Special return—Iron rails.....tons	7	50	.....
Steel rails.....	.....	6,508	1,282

### SCOTCH PIG IRON

has not varied a great deal since my last letter was penned, and values remain almost on the same level as they were a week ago. Warrants opened at 41/6, touched 41/6 on October 7, and closed at 41 7/8 @ 41/8, with a tolerable amount of business doing. Special brands are mostly firm, owing to the reduced make and stocks. There are now 92 furnaces at work in Scotland, against 94 a year ago. In Connal's stocks the quantity of pig is 582,532 tons, against 589,169 tons a year ago. Last week's decrease was 600 tons, but this rate is scarcely likely to be perpetuated. Shipments are now 74,806 tons behind those to the same date of last year. Imports of Middlesboro' pig into Scotland are 2937 tons in arrears. A failure for £7000 odd took place last week in the Scotch iron trade.

### Crucible vs. Bessemer Steel.

Concluding an article enumerating the leading points in the controversy over the substitution of Bessemer steel for crucible steel in Great Britain, the *Bulletin* of the American Iron and Steel Association says: "By a coincidence we are just in receipt of a letter from a high American authority upon the subject treated of in Sir Henry Bessemer's reply to Mr. Seebohm. This letter is from Mr. Wm. F. Durfee, of Bridgeport, Conn., an engineer and metallurgist of acknowledged ability, who also enjoys the high honor of having made the first steel by the Bessemer process ever manufactured in this country. His letter confirms Sir Henry Bessemer's declarations that Bessemer steel has been used and is now used as a substitute for the best crucible steel. It is as follows:

To the Secretary of the American Iron and Steel Association.—DEAR SIR: I note in the *Bulletin* of October 8th an extract from an English paper calling attention to the increasing employment of Bessemer steel for "uses hitherto served by crucible steel." After enumerating a long list of articles which have been made with success from Bessemer steel, the English writer says: "Nor has cutlery itself been found too hard a test; for this special steel has been made even into razors, with decidedly good results." That steel made by the Bessemer process will eventually take the place of steel made in the crucible I have never had a doubt; though it may hasten slowly, it will progress surely to that end. One of the greatest hindrances to the employment of Bessemer steel for a great variety of uses to which it is well adapted is the ignorance which exists on the part of the majority of the consumers of steel relative to the matter of hardening and tempering. They insist on having a steel so high in carbon that, after hardening, the temper has to be drawn in order that the implement made therefrom shall be suited to its intended purpose. A much more satisfactory method of procedure is to employ a steel so low in carbon that the hardening operation alone is sufficient to fit the tool for the use proposed. The result of such practice will be diminished first cost of the steel, increased strength and toughness in the article made from it, greater uniformity in the goods turned out, and, consequently, a general improvement of their quality and a cheapening of the cost of their manufacture. I have no doubt that an investigation would show that a large proportion of the cheap table cutlery sold is, even now, made of Bessemer steel of a quality much superior to a cheap grade of crucible steel. I have in my possession two jack-knives and a razor forged from the first Bessemer steel made in America. These articles are good illustrations of what is possible. The steel of which the implements named were made was so low in carbon that they were hardened as hard as possible and left in that condition. As regards the quality of the tools named I will say that the jack-knives are as good as any that ever came under my notice, and the razor was used by my father for 15 years, to his entire satisfaction. Yours truly, W. F. DURFEE.

BRIDGEPORT, CONN., October 10, 1884.

**Laborers' Wages in Pittsburgh.**—The *Pittsburgh Commercial Gazette* says: "At Phillips, Nimick & Co's mill the lowest wages paid are \$1.35 per day; Graff, Bennett & Co., \$1.35; Singer, Nimick & Co., \$1.30; J. Painter & Sons, Brown & Co., Hussey, Howe & Co., William Clark & Co., Shoenberger & Co., Miller, Metcalf & Parkin, Jones & Laughlins, Carnegie Brothers & Co., Moorhead & Co., Lindsay & McCutcheon and the Black Diamond Steel Works, \$1.25; W. D. Wood & Co., \$1.40."

A cable dispatch from Glasgow, dated the 24th inst., states that the riveters in the Clyde shipyards have struck against the piece-work system. Their places were filled with non-union men, but the strikers attacked and drove away the latter.







Parallel, Prentiss.....dis 25  
Parallel, Simpson's Adjustable.....dis 40  
Saw Filers, Bonney's.....\$ doe \$15.00.....dis 33 1/2  
Saw Filers, Stearns.....dis 20 & 10  
Saw Filers, Hopkins.....\$ doe \$17.50.....dis 10  
Saw Filers, Reading.....dis 10 & 10  
Saw Filers, Wentworth.....dis 20 & 10  
Cord Hand Vices.....dis 20  
Richardson's Vise and Anvil.....dis 25

**Washer Cutters.**  
Smith's Patent.....\$ doe \$12.00, dis 30 & 10 & 10  
Johnson's.....\$ doe \$11.00.....dis 33 1/2  
Penny's.....\$ doe \$10.00, dis 33 1/2  
Bonney's.....dis 20 & 10

**Washers.**—See Nuts and Washers.....dis 60 & 10

**Well Wheels.**.....dis 60 & 10

**Wire.**  
Brass and Copper, new list, Jan. 18, 1884.....dis 20  
Market, Bright and Annealed, Nos. 0 to 18.....dis 07 1/2  
Market, Coppered.....dis 57 1/2  
Market, Galvanized.....dis 55  
Market, Tinned, Tinned list.....dis 57 1/2  
Stone, Bright and Annealed Nos. 10 to 30.....dis 70  
Stone, Bright and Annealed Nos. 27 to 30.....dis 75  
Stone, Tinned, Tinned list.....dis 77 1/2  
Tinned Iron Wire.....dis 62 1/2  
Wire on Spools.....dis 60 & 10  
Annealed Fence, Nos. 8 & 9.....dis 67 1/2  
Annealed Grape, Nos. 10 to 14.....dis 67 1/2  
Fence Staples.....\$ 500 to 2, dis 30 & 10  
Fence Staples, Galvanized.....\$ 600 to 2, dis 30 & 10  
Stub's Steel Wire.....\$ 60 to 2, dis 30 & 10  
Barb Fence.....See Trade Reporter  
Steel Music Wire, Nos. 7 to 30.....\$ 1.00 to 2  
Picture Wire.....dis 55  
Clothes Line Wire.....\$ 500 to 2, dis 30 & 10  
Wire Cloth, green, drab and black, \$ 100 sq. ft.....\$2.00 @ 2.25 net

**Wrenches.**—American Adjustable.....dis 45  
Baxter's Diagonal "B".....dis 33 1/2  
Coe's Genuine.....cash in 10 days, dis 60 & 10  
Coe's "Mechanics".....dis 60 & 10  
Coe's Pattern, Malleable.....dis 70 & 10  
Coe's Pattern, Wrought.....dis 75  
Hard Standard.....dis 65 & 10  
Wire on Spools.....dis 60 & 10  
Bemis & Call's Patent Combination.....dis 30 & 10  
Bemis & Call's Merrick's Pattern.....dis 25  
Bemis & Call's Briggs' Pattern.....dis 25  
Bemis & Call's Cylinder or Gas Pipe.....dis 40  
Alken's Pocket (Bright).....\$ 60.00, dis 50 & 10  
The Favorite Pocket (Bright).....\$ 60.00, dis 40 & 10  
Webster's Patent Combination.....dis 25  
Agricultural Wrenches, Eberhard.....dis 33 1/2  
"Always Ready".....dis 25  
Boardman's.....dis 25  
Alligator.....dis 40 & 10  
Donohue's Engineer.....dis 25

**Winners.**  
Novelty, for Common Tubs, No. 2, 10-inch.....\$50.00  
Novelty, for Common Tubs, No. 3, 11-inch.....34.50  
Excelsior, for Stationary Tubs, No. E, 10-inch.....39.00  
Excelsior, for Stationary Tubs, No. F, 11-inch.....43.50  
Excelsior, with Folding Bench, No. A, 10-inch.....48.00  
Excelsior, with Folding Bench, No. B, 11-inch.....52.50  
Universal, No. 23.....30.00  
Universal, No. 2.....33.00  
Universal, No. 14.....34.50  
Universal, No. 1.....57.00  
Universal, for Set Tubs, A 23.....39.00  
Universal, for Set Tubs, B 14.....48.00  
Universal, for Set Tubs, C 1.....66.00  
Adams & Co. No. 8.....30.00  
Peerless No. 23.....30.00  
Peerless No. 33.....34.50  
No. 90 Improved 23.....30.00  
"Metropolitan," No. 23.....30.00

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# WHOLESALE METAL PRICES, October 29, 1884.

## METALS.

**IRON.**—Duty: Pig, 8-10¢ to 11-10¢ per lb.; provided that no Bar Iron shall pay a less rate of duty than 35¢. Sheet, 11-0¢ to 15-10¢ per lb. Band, Hoop and Scroll, 1¢ to 1-10¢ per lb. Railroad Bars weighing more than 25 lb per yard, 7-10¢ to 1¢ per lb.

### Standard American Pig Iron.

Foundry No. 1 X..... per ton \$19.50 @ 21.00  
Foundry No. 2 X..... per ton 18.00 @ 19.50  
Gray Forge..... per ton 16.50 @ 17.50

### No. 1 Scotch Pig Iron.

Cambro..... per ton 20.50 @ 21.00  
Coltess..... per ton 22.00 @ 22.50  
Shotts..... per ton 21.50 @ 22.00  
Glenarock..... per ton 20.00 @ 21.00  
Langdon..... per ton 21.00 @ 22.00  
Summerlee..... per ton 21.00 @ 22.00  
Dalmellington..... per ton 20.00 @ 21.00  
Eglington..... per ton 20.00 @ 21.00  
Clyde..... per ton 20.00 @ 21.00

### Rails.

Steel at Eastern mills..... per ton 28.00 @ 30.00  
Old Rails, Ts..... per ton 17.00 @ 18.00

### Scrap.

Wrought, per ton, from yard..... 19.00 @ 20.00

### Bar Iron from Store.

Common Iron:  
¾ to 1 in. round and square..... per lb. 1.9 @ 2.0  
Refined Iron:  
¾ to 1 in. round and square..... per lb. 2.0 @ 2.1  
1 to 1 ½ in. round and square..... per lb. 2.1 @ 2.2  
1 to 1 ½ in. x ¾ to 1 in. x ¾..... per lb. 2.2 @ 2.3  
Rods—¾ and 1-16 round and sq..... per lb. 2.40 @ 2.50  
Bands—1 to 6-16 to No. 12..... per lb. 2.40 @ 2.50  
"Burden's Best" Iron, base price..... per lb. 2.50  
"Burden's" H. B. & S. Iron, base price..... per lb. 2.50  
Norway Nail Rods..... per lb. 54 @ 55

### Sheet Iron from Store.

Common R. G. Cleaned.  
Nos. 9 to 16..... per lb. 2.70 @ 2.80  
17 to 20..... per lb. 2.80 @ 2.90  
21 to 24..... per lb. 2.90 @ 3.00  
25 and 26..... per lb. 3.00 @ 3.10  
27..... per lb. 3.10 @ 3.20  
28..... per lb. 3.20 @ 3.30  
29..... per lb. 3.30 @ 3.40  
30..... per lb. 3.40 @ 3.50  
Galvanized, 10 to 20..... per lb. 54 @ 55  
Galvanized, 21 to 24..... per lb. 54 @ 55  
Galvanized, 25 to 26..... per lb. 54 @ 55  
Galvanized, 27..... per lb. 54 @ 55  
Galvanized, 28..... per lb. 54 @ 55  
American Russia..... per lb. 104 @ 105  
Russia..... per lb. 11 @ 12  
American Cold Rolled B. B..... per lb. 5 @ 6

### Iron Wire.

**STEEL.**—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ per lb. or less, 45¢ ad. val.; valued above 4¢ and not above 10¢ per lb., 2¢ ad. val.; valued above 10¢ per lb., 3¢ ad. val. Extra—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 1½¢ per lb. in addition to above; Steel Circular Saw Plates, 1¢ per lb. in addition to the above.

### American Steel.

For American Steel, see Pittsburgh quotations.

### English Steel.

Best Cast..... per lb. 154 @ 155  
Extra Cast..... per lb. 154 @ 155  
Circular Saw Plates..... per lb. 144 @ 145  
Round Machinery Cast..... per lb. 104 @ 105  
Swaged Cast..... per lb. 104 @ 105  
Best Double Shear..... per lb. 104 @ 105  
Blister, 1st quality..... per lb. 10 @ 11  
German Steel, Best..... per lb. 10 @ 11  
3d quality..... per lb. 9 @ 10  
Sheet Cast Steel, 1st quality..... per lb. 154 @ 155  
3d quality..... per lb. 124 @ 125  
T.N.—Duty: Plates, Sheets, Taggers and Termes, 1¢ per lb.; Bars, Block and Flat Termes.  
Ranco..... per lb. 204 @ 21  
Straits..... per lb. 194 @ 20  
English..... per lb. 204 @ 21  
Bar..... per lb. 204 @ 21

### Charcoal Tin Plates.

C 10x14..... 225 sheets..... per box \$5.50 @ \$6.25  
C 12x12..... 225 sheets..... per box 11.00 @ 12.75  
C 10x28, 1..... per box 6.75 @ 7.75  
C 12x12..... 225 "..... per box 6.75 @ 7.75  
C 14x20, 112..... per box 6.75 @ 7.75  
C 12x14x17 100 "..... per box 5.25 @ 5.50  
C 12x14x17 100 "..... per box 5.50 @ 7.00  
each additional X add..... 1.90

### Coke Tin Plates.

Best. Ordinary.  
C 10x14..... \$5.37 ½ @ 4.87 ½ @ \$5.00  
C 14x20..... 5.50 @ 5.25 @ 5.00  
C 12x12..... 5.50 @ 5.25 @ 5.00  
C 10x28, 112 sheets..... 10.50

### Terne Plates.

C 14x20 M. F. 7.25..... \$7.00  
C 14x20 Troughing, Old Process..... 14.25  
C 10x28..... \$5.00 @ \$4.00 @ \$4.75 @ 4.87 ½  
C 14x20..... 13.00 @ 12.50 @ 9.75 @ 9.50 @ 9.68 ½  
C 10x28..... 13.00 @ 12.50 @ 9.75 @ 9.50 @ 9.68 ½  
C 10x28..... 13.50 @ 13.00

### Tin Boiler Plates.

IX 14x20, 2 sheets for No. 7, 112 sheets..... @ \$13.50  
IX 14x20, 2 " " No. 8..... @ 14.00  
IX 14x21, 2 " " No. 9..... @ 14.50

### COPPER.

Duty: Pig, Bar and Ingot, 4¢. Old Copper, 3¢. Manufactured (including all articles of which Copper is a component of chief value), 35¢ ad. valorem.  
Ingot, Lake..... per lb. 134 ½ @ 135 ½  
Ingot, Baltimore..... per lb. 124 ½ @ 125 ½  
Brassers' Copper, ordinary sizes, 16 oz. per sq. ft. and over..... @ 21  
Brassers' Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. ft..... @ 23  
Brassers' Copper, 10 oz. and 12 oz. per sq. ft..... @ 25  
Lighter than 10 oz. per sq. ft..... @ 28  
Circles less than 9 in. in diam..... @ 24  
" 8 in. in diam. and over..... @ 24  
Segment and Pattern Sheets..... @ 24  
Locomotive Fire-Box Sheets..... @ 22  
Sheathing Copper, over 12 oz. per sq. ft..... @ 19  
Bolt Copper..... @ 22  
Copper Bottoms..... @ 22  
Nickel-Plated Sheathing..... @ 35  
Plating extra..... for boilers @ 37  
Flat Copper Boiler Bottoms or Pits Bottoms, cut to special sizes..... @ 37

### Tinning.

14x18, by the case..... per sheet, 5¢  
14x18, less than case..... per sheet, 5¢  
For tinning both sides, double the above amount.  
O'Neill's Patent Platinized Copper, Net 14x18..... 2 and 16 oz. and heavier 35¢ By the case, per lb. 94¢  
12 oz. and lighter..... 89¢  
Boiler Sizes:  
7 in., 14x20, 8 in., 14x20, 14 and 16 oz. and heavier 37¢ By the case, per lb. 40¢  
(And all sizes not over 20 in. wide.)  
14 and 16 oz. and heavier..... per lb. 39¢  
12 oz..... 42¢

### Copper Wire.

(See Wire.)

### Sheathing Metal.

ellow Sheathing Metal, per lb..... 20 @ 21

### BRASS AND GERMAN SILVER.

Brown & Sharpe's Gauge the Standard for Metal;  
Old English Gauge the Standard for Wire.  
Brass Manufacturers' Price List, January 17 1884..... dis. 20

## LEAD.

Duty: Pig, 82¢ per 100 lb.; Old Lead, 2¢ per lb.; Pipe and Sheet, 3¢ per lb.

American..... 4 @ 4.12 ½  
Bar..... 4 ½ @ 4 ½  
Pipe..... 40¢  
Block Tin Pipe..... 15¢ dis. 20  
Tin Lined Pipe..... 64¢ dis. 20  
Sheet..... Drop, 6¢; Buck, 7¢  
Chilled Shot..... 7¢

## ANTIMONY.

Hallett's..... per lb. 11 @ 11 ½  
Cookson..... 11 @ 11 ½

## SPELTER.

Duty: Pigs, Bars and Plates, \$1.50 per 100 lbs.

American, cash..... 4 ½ @ 5 ½  
Bergenport..... 4 ½ @ 5 ½

## ZINC.

Duty: Pig or Block, \$1.50 per 100 lbs.

Sheet, 24¢ per lb.  
600 lb casks..... 5.50 @ 5.63 ½  
Zinc—Open..... 6 @ 6 ½  
Zinc Tubing..... dis. 10 @ 20

## Zinc Tubing.

Plain..... 27  
Fancy..... 28  
Scotch and Extra Patterns..... 30

## RABBIT METAL.

N. P. U..... per lb. 7 @ 7.50  
A. 28¢; B. 28¢; C. 14¢.

## WIRE.

Iron Wire.—Put up in 63 lb bundles.  
Nos. 00 to 9, 10, 11, 12, 13, 14, 15, 16, 17, 18.

10 11 11 ½ 12 ½ 14 15 16  
Bright Market Wire..... dis. 65  
Charcoal..... dis. 47 ½  
Bale Wire, Nos. 7 to 12..... dis. 60  
Annealed Market Wire..... dis. 65  
" Grape Wire, Nos. 10 to 14..... dis. 65  
" Bousmer Steel Wire..... dis. 67 ½  
Coppered Market Wire..... dis. 60  
" Bale Wire, Nos. 7 to 12..... dis. 60  
Galvanized Market Wire..... dis. 60  
" Fence Wire..... dis. 60

## Stone or Weaving Wire.

Nos. 16 17 18 19 20 21 22 23 24 25 26  
Cents..... 14 15 16 17 18 19 20 21 22 23 24 25 26  
Nos. 27 28 29 30 31 32 33 34 35 36  
Cents..... 27 28 29 30 31 32 33 34 35 36  
Nos. 37 38 39 40 41 42 43 44 45 46  
Cents..... 37 38 39 40 41 42 43 44 45 46  
Nos. 47 48 49 50 51 52 53 54 55 56  
Cents..... 47 48 49 50 51 52 53 54 55 56  
Nos. 57 58 59 60 61 62 63 64 65 66  
Cents..... 57 58 59 60 61 62 63 64 65 66  
Nos. 67 68 69 70 71 72 73 74 75 76  
Cents..... 67 68 69 70 71 72 73 74 75 76  
Nos. 77 78 79 80 81 82 83 84 85 86  
Cents..... 77 78 79 80 81 82 83 84 85 86  
Nos. 87 88 89 90 91 92 93 94 95 96  
Cents..... 87 88 89 90 91 92 93 94 95 96  
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Cents..... 97 98 99 100 101 102 103 104 105 106  
Nos. 107 108 109 110 111 112 113 114 115 116  
Cents..... 107 108 109 110 111 112 113 114 115 116  
Nos. 117 118 119 120 121 122 123 124 125 126  
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Nos. 137 138 139 140 141 142 143 144 145 146  
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Cents..... 167 168 169 170 171 172 173 174 175 176  
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Nos. 777 778 779 780 781 782 783 784 785 786  
Cents..... 777 778 779 780 781 782 783



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Manufactories at Terryville, Conn., and Geneva, Ohio.  
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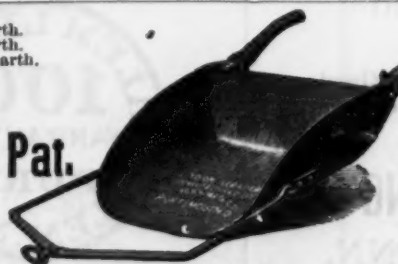
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No. 1 Carries 7 feet earth.  
No. 2 Carries 5 feet earth.  
No. 3 Carries 3 1/2 feet earth.



PATENTED  
December 27th, 1881.  
Runners Patented  
February 11th, 1884.

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The Lightest and Strongest Scraper made. The body is made of one single piece of steel. The handles are fastened inside of fold, and free from all obstructions. The body, bail and runners are all made of steel. Especially suited for contractors. Send for circulars. Manufactured by

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Complete outfits for Actual Workshop Business. Lathes for Wood or Metal. Circular Saws, Scroll Saws, Formers, Mortisers, Tenoners, &c., &c. Machines on trial if desired. Descriptive Catalogue and Price List Free.

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Best and Cheapest.

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HUGUNIN IMPROVED ADJUSTABLE SASH BALANCES, Mechanical Substitute for Weights, 3 Sizes, No. 1, 1 1/2 in. wide; No. 2, 1 1/4 in.; No. 3, 1 1/2 in.—for Sashes under 30, 30 and 60 lb. each. The Hugunin Improved Balances overcome want of squareness in frame or sash; are instantly adjustable to weight of sash, after being applied, without removing the sash, and the sashes work and are locked as with weights. They are made of both malleable and gray iron, and are fully warranted to possess all the merits claimed for them. If giving same his name and appropriating the date of one of my minor patents—Nov. 6, 1877—he having no patent, fraudulently sold through dealers in sash goods. (The genuine have "Robt. B. Hugunin, Patentee and Solely Authorized Maker," cast on them. The unimproved copied style 1877, unrecommended, I offer at less than half price of the improved rods. The Hugunin New Sash Locks the cheapest, with widest range of usefulness. No unpatented clasp trap to get your money, but a simple, fully warranted mechanism. Address: ROBT. B. HUGUNIN, Hartford, Conn., U. S. A., for goods, prices, &c.

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PATENT BALANCED  
HYDRAULIC AND  
STEAM VALVES.



J. S. GLENN, Proprietor.  
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115 Fremont Street,  
CHICAGO.

## HARDWARE NOVELTIES.

## New Hardware Specialties.

The Globe Manufacturing Company, 926 Walnut street, Philadelphia, have issued a catalogue in which they call the attention of the trade to their various patented special-

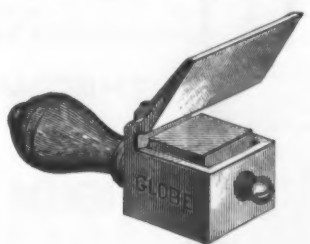


Fig. 1.—Globe Scissors Sharpener.

ties, many of which they speak of as having no competition, and as articles of general need and usefulness. The catalogue contains a variety of articles suitable mostly for household use, two or three of which are shown in the illustrations which we give herewith. Fig. 1 represents the Globe Scissors Sharpener. It consists of a small me-

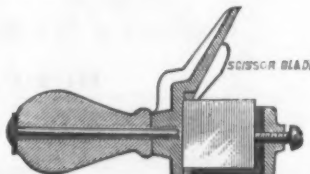


Fig. 2.—Sectional View of Scissors Sharpener.

talic case inclosing an adjustable cubical sharpener of Washita oil-stone, against which the scissors blade is rubbed, being kept at the requisite angle to give a good edge by an inclined guiding face. The sharpener is also provided, it will be seen, with a handle by which it is held. When one edge becomes worn the stone can be turned to present another face by loosening



Fig. 3.—Toaster for Gas Burner.

and adjusting the screw. And, as each stone has 24 edges, it will last a long time if carefully used. New stones can be inserted when the old one becomes too much worn, as the manufacturers keep Arkansas and Washita stones on hand, and can furnish them at small expense. The construction of the sharpener is readily seen from the sectional

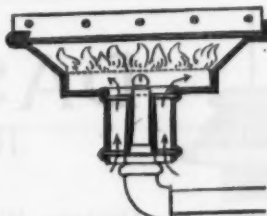


Fig. 4.—Sectional View of Toaster for Gas Burner.

view given in Fig. 2. Of this article two sizes are made. No. 1 has a 1/2-inch cube oil-stone, guide blade 1 1/4 inches long and length of 2 1/2 inches, and is intended for all kinds of small scissors. No. 2 has a 3/4-inch cube oil-stone, guide blade 2 1/4 inches and length of 3 1/4 inches, and is intended for larger scissors. The position in which the scissors blade is held during the process of sharpening is indicated in Fig. 2.

The same manufacturers are making a Toaster which they designate as the Globe



Fig. 5.—Toaster for Gas Stove.

Radiant Heat and Gas Stove Toaster. It is made in three styles, one shown in Figs. 3 and 4 for a simple gas burner; one shown in Fig. 5 for gas stoves, and one similar to Fig. 5, without the legs, for ranges and coal stoves, this latter being designed to allow toast to be made without interfering with the draft of the fire. The gas-burner toaster shown in Figs. 3 and 4 consists simply of a thin removable copper plate supported on the burner, adapted to give great heat with no smoke. The bread to be toasted lies upon



Fig. 6.—Combination Kitchen Implement.

wires close to the copper plate, and the radiant heat therefrom makes, it is claimed, superior toast, which they describe as uniformly browned and without hardening the interior of the bread. It is intimated also that the article can be given a wider range of usefulness by removing the wires and inserting a tin or pan, when it is claimed

that light cooking may be done over the ordinary gas burner. The same principle is carried out with the toasters for gas stoves and ranges. The convenience of this article, if it does the work satisfactorily, will be readily appreciated by our readers.

Fig. 6 represents the Globe Combined Detachable Handle, Tack Puller, Hammer, Screw-Driver and Kittle Scraper which comprehensive title, we are informed, does not fully represent the range of use for which this article is designed, and it should be added that it is further intended as a stove lifter and for use around cooking stoves. Its construction is shown in the cut, its length being 8 1/4 inches. It is finished in bronze or japan, and packed in paper boxes of one dozen each and in cases of 12 dozen.

## The Perkins Toe Calks.

The Rhode Island Horse Shoe Company, Providence, R. I., for whom Durrie & McCarty, 97 Chambers street, New York, are agents, are offering to the trade the Perkins New Chisel-Pointed Center-Prong Toe Calk, which is represented in the accompanying cut. The prong, it will be perceived, is in the center of the calk, and is in position to be driven into shoe at a point where there is solid iron to hold it, and where, it is claimed, it cannot split the crease or tear out the toe nail holes. The liability of burning the toe of the shoe when giving a welding heat, it is also claimed, is much reduced. The shape of the prong is such as to allow it to be easily



The Perkins Chisel-Pointed, Center-Prong Toe Calks.

driven into the shoe, and to hold it firmly during the process of welding. The calks are made both blunt and sharp, as represented in the end views which are given in the cut. Of these calks the manufacturers are making the leading sizes in three lengths—short, medium and long. The medium length corresponds in size to the calks now on the market. With this variety of sizes they announce that they are enabled to furnish calks, both toe and side, for all styles, sizes and weights of horse and mule shoes. The calks are packed either in the usual 25-pound wooden boxes or in 10-pound paper boxes, packed in 100-pound wooden cases. For the convenience of the trade different colored labels are used for the blunt and sharp calks, green designating the blunt and yellow the sharp. From the fact that the Rhode Island Horse Shoe Company manufacture these from the raw material, they claim that they are enabled to furnish a first-class calk at a low figure. They are also able, we understand, to fill orders promptly. The prices are given in the Trade Report.

## New Police Goods.

In the accompanying illustrations we represent some new styles of Police Hardware, including Hand Cuffs made by John P.



Fig. 1.—Bean's Patent Hand-Cuffs.

Lovell's Sons, Boston, Mass., and another style manufactured by the Marlin Fire Arms Company, New Haven, Conn. Bean's Patent Police Hook and Bean's Patent Chain

hand-cuffed together. Among other advantages claimed for this article are these: That it is made so as to fit the wrist exactly, whether it be large or small; that the result is a much lighter and better-looking cuff,



Fig. 3.—Bean's Patent Police Hook.

while the strength is increased; and that the cuffs can be carried closed in the pocket, occupying much less space than the old style. The manufacturers refer to the tests to which these cuffs have been subjected by officers who have used them, and the satisfaction with which they are regarded.



Fig. 4.—Bean's Patent Twistors.

Haven, Conn., and sold by Schoverling, Daly & Gales, 88 Chambers street, New York. These hand-cuffs were invented and patented by R. H. Daley, of San Francisco, Cal., and J. F. Zollner, of Napa City, Cal., who is spoken of as a sheriff and officer of much experience. A number of them were made by hand and sold to parties in that locality, but they are now being placed on the market for general sale. They are described as made of the best cast-steel drop forgings and finished in the best manner. The hand-cuffs when adjusted are automatically double locked, and once on the prisoner they cannot be opened without the use of the key. The bar is notched on both sides (not on top or bottom) and secured by a double lock, so that, the manufacturers claim, any effort to pick the lock on one side makes it more



Fig. 2.—Daley's Improved Patent Hand-Cuffs.

Twistors, made by the former concern, are also represented.

Fig. 1 represents Bean's Patent Hand-Cuffs, made, as stated above, by John P. Lovell's Sons, Boston. They are claimed to be constructed on new principles. The arm does not go through the lock case, as in the old cuffs, but is concealed in the case of the cuffs, thus rendering it difficult to break the lock and making it otherwise more secure. This cuff has a stop catch in the lock, which is operated with the thumb by a button on the outside of the case, as indicated in the illustration, by means of which it can be

secure on the other. The peculiar construction of the key, which has to displace the mate of itself, it is claimed, debars the possibility of anything but a key so constructed opening the lock. Further advantages which are mentioned are as follows: That there is no possibility of getting them on the prisoner wrong, but that backward or forward it is immaterial; that the key slot is easy to get at and in the front, where, it is intimated that for the safety of the officer it should be, as he can insert his key and unlock it without removing his eyes from the prisoner; that the cuffs are round and have no sharp angles or corners; that they do not cut or wear the clothes and are easy to carry in the pocket. The notches also, it is added, do not come in contact with the flesh.

Fig. 3 is an illustration of Bean's Patent Police Hook, made by John P. Lovell's Sons, Boston. This hook, as is readily understood from the cut, is operated by the action of the hand, the same as the chain twistors, referred to below. In their suggestions with reference to its use, the manufacturers say



that it should be held in the hand, with the open part up, with the upper end of the handle between the forefinger and thumb, the other fingers being upon the lower end of the arm. Then, after securing the prisoner by the action of closing, the hand brings the movable part of the hook firmly against his wrist, thus holding him secure. The movable part of the hook is instantly thrown open by the coil spring around the pin that holds the two parts of the hook together, so that the officer can release his prisoner by simply opening his hand. The manufacturers refer to this hook as preferred by many officers to the twisters.

The Twisters, which are made by the same manufacturers under the patent of Edward D. Bean, whose inventions are embodied in so many of the police goods which they make, are different, it is claimed, from all others, having, as represented in the cut, one open handle into which the other falls by the natural action of the hand, thus forming one solid handle on which the officer can get a much firmer hold than where the two handles are separate. The advantage of this contrivance, in the fact that the officer is not liable to cut his hands by getting the flesh caught between the two handles when making an arrest, will be appreciated, this objection having been found in the use of old-style twisters.

#### The Henderson Furnace and Process.

The trials of this furnace and process which are being made at Bellefonte, Pa., have been thus far very satisfactory. The metal produced, which was rolled into boiler plates by Messrs. McIlvain & Sons, of Reading, was found soft and very ductile. Some of the samples tested by the Cambria Iron Company gave a tensile strength of 67,000 pounds per square inch, with 36 to 42 per cent. contraction of area and 22 per cent. elongation. In these trials a sand lining was used, which necessitated the use of Bessemer pig iron. The following facts concerning the process, which were forwarded to us, testify to its economy: With continuous working 25 casts of soft steel analyzing .12 to .16 per cent. carbon are made in 24 hours from a charge of half pig and half scrap steel (crop ends), with 5 to 10 per cent. of Lake Superior ore. With the lesser amount of ore the average waste in a week's work was 2.38 per cent.—that is, the amount of steel produced was but 2.38 per cent. less in weight than the weight of the pig and steel scrap charged. Using the larger proportion of ore in the charge, the average waste for one week's work was .71 per cent. With 2-ton charges the coal used averaged 560 pounds per ton, Pennsylvania gas coal being used in the gas producer. The slag contained, according to an analysis of Prof. Morrell, of Johnstown, 34 per cent. of metallic iron, with no more phosphorus than was originally present in the ore, so that the slag is as valuable for future smelting as an ore of similar chemical analysis. It thus appears that there is as much iron produced in the form of ingots and in the slag as was present in the charge of metal and ore, while the iron in the slag can be recovered by smelting. In the week ending October 28, 25 casts of soft steel were made in 120 hours. The metal was charged at 2.45 p. m. Monday, and the last cast was made Saturday at 3.30 p. m. Using Cornwall pig which contained .80 to 1.25 per cent. of copper, better results were obtained as to quality of metal

produced. The next trials will be made on sand and lime linings, using pig and sand ore without scrap.

**The Eads Ship Railway.**—Capt. James B. Eads has placed a model of his proposed Tehuantepec ship railway on exhibition in the warehouses of the Union Switch and Signal Company, at Pittsburgh. The arrangement it said to be strikingly simple. By it a miniature ship is lifted from the water by a pontoon sunk below the surface immediately under the vessel, which, when in position, rests in a cradle, in which it is ready for transportation by rail. Rails are laid on the pontoon, which, when elevated, fit exactly to those on the land. The proposed pontoon as designed is 450 feet long, 75 feet wide and 15 feet deep. The railway across the isthmus will be 134 miles long, will cost about \$80,000,000 and will save 8250 miles of travel. Some 40 of the stockholders of the company are Pittsburgh capitalists.

Richards & Hartley and Challinor & Taylor, Pittsburgh, will start up their new flint-glass factories at Tarentum soon. A large number of glassworkers from the South Side go to Tarentum to work there.

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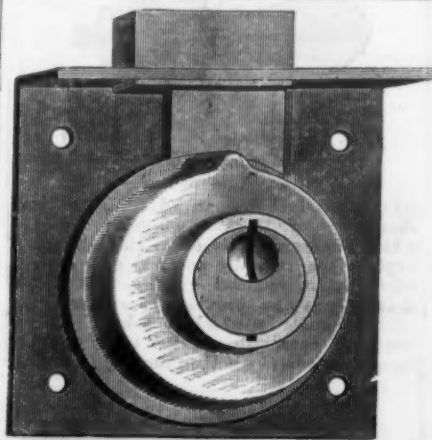
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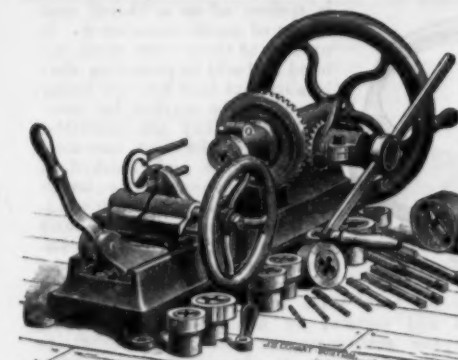
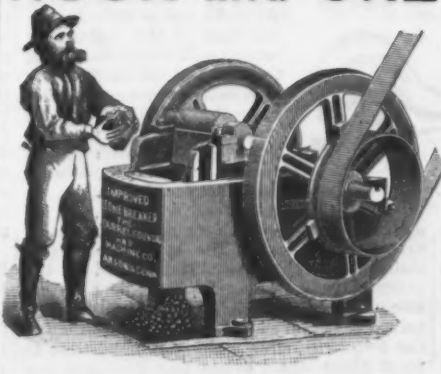
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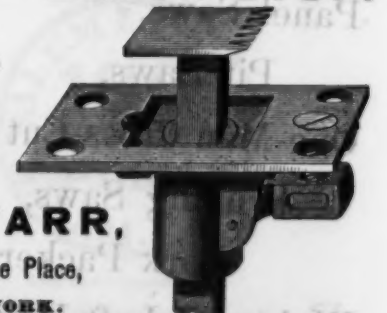
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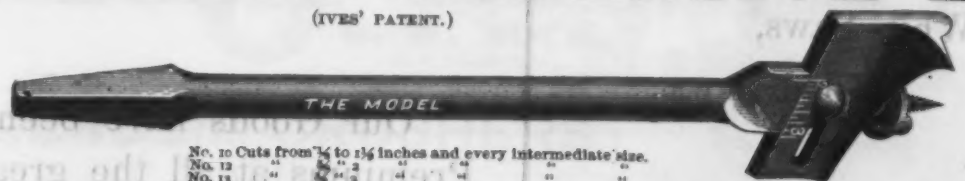
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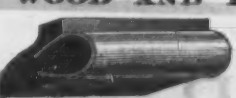
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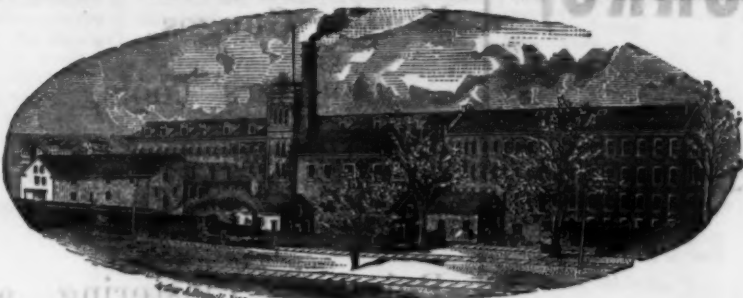
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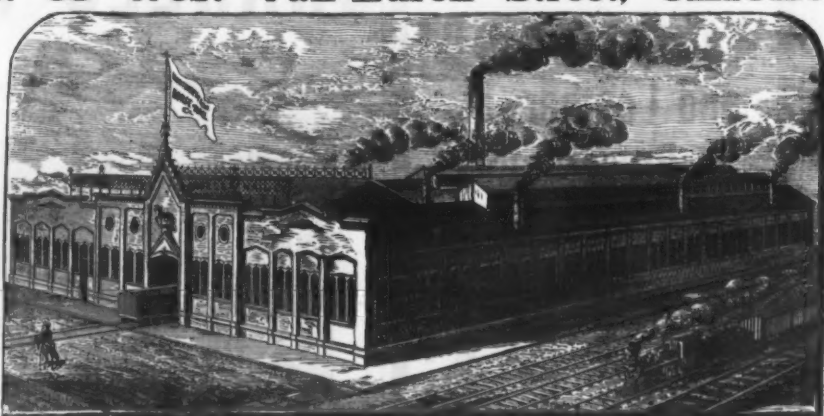
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- 4th. It has met with greater success than all others combined.
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- 7th. It can be made plain or scientific.
- 8th. It is the ONLY practical Rink Skate in America.
- 9th. It is endorsed by the finest experts and professionals in the world as being the finest movement.



THAD. A. NEELY'S  
MUNCIE SKATE.  
PATENTED.

ADJUSTABLE BOTTOM.

MUNCIE IND.

THE ONLY PRACTICAL RINK SKATE MANUFACTURED.

SEND FOR CIRCULARS AND PRICES.

## TESTIMONIALS.

ROME, ILL., Oct. 12, 1880.  
MR. THAD. A. NEELY, Muncie, Ind.—Dear Sir: I have been engaged in the Roller Skating business for eight years, and during that time have tried many different Skates, but find the MUNCIE SKATE much superior to all others for general use.  
Yours respectfully,  
O. D. CHARLES.

NEW ORLEANS, LA., Oct. 27, 1882  
MR. THAD. A. NEELY, Muncie, Ind.: We have great pleasure in testifying to the merits of your Muncie

ROLLER SKATE. We have had ten years' experience in Roller Skating in many different countries, during which time we have seen and tested a hundred or more different patents. We have had your Skate in daily use now over two months, and have therefore given it a good FAIR TRIAL, and can HONESTLY assert it to be superior to any we have used before. We are, dear sir, yours faithfully, LANE BROS. (English Professionals of London), English Roller Skaters, with W. W. Cole's Circus, U. S. America.

PRAIRIE DU CHIEN, WIS., Sept. 3, 1882.  
THAD. A. NEELY, Muncie, Ind.: We have been using your MUNCIE ROLLER SKATE for the last three months, and have pleasure in stating that we consider it superior to any that we have previously seen or used, and we shall always recommend it as such.  
Yours faithfully,  
CHARLES & LILLY FLETCHER,  
(Fletcher's Trio of Skaters),  
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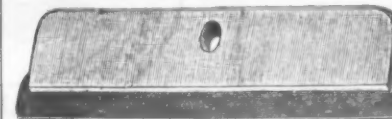


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OR  
BROOMS.

Beware of Infringements.

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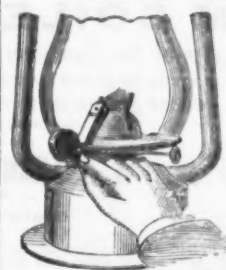


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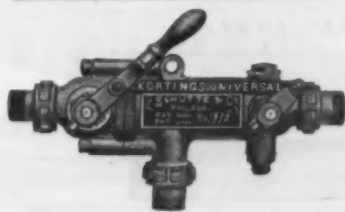
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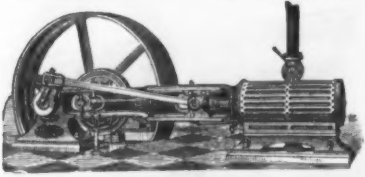
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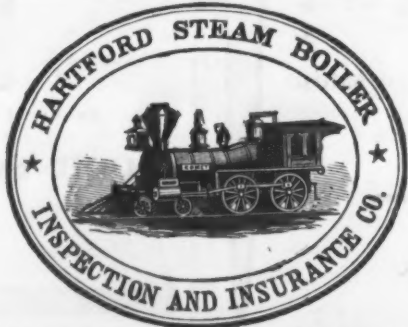


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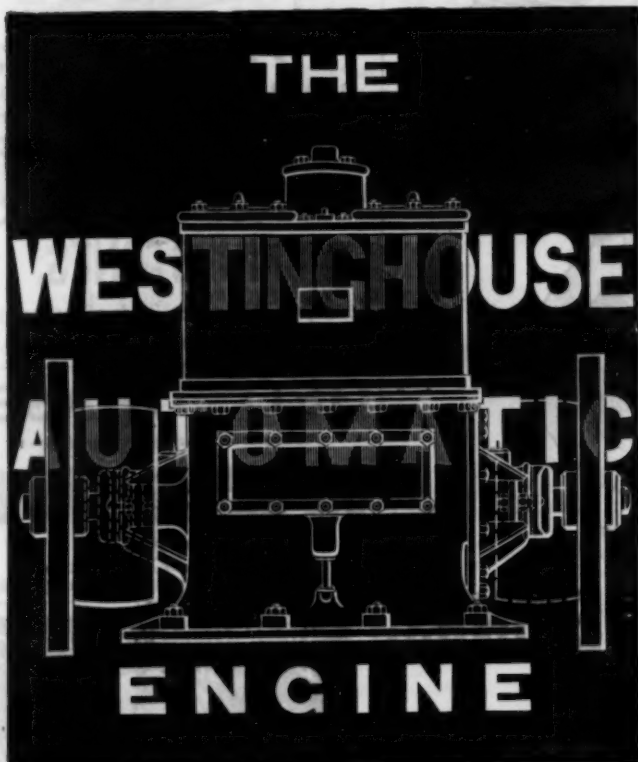
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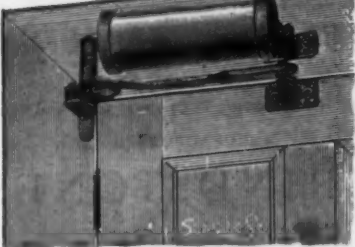
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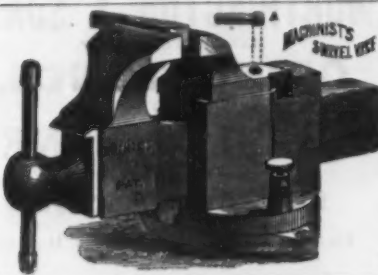


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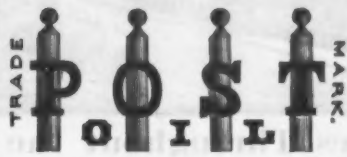
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Leather dressed with this oil will not crack or rot, as heat, cold, water or gas has no effect on it. It will spread one-third further and last much longer than any oil for the same purpose. It never turns rancid; will keep in any climate. Belts may be run in water at one end and a hot room at the other, and still be soft, dry and pliable. Warranted not to start glue-laps or gum on belts or pulleys, and to keep the surface perfectly smooth.

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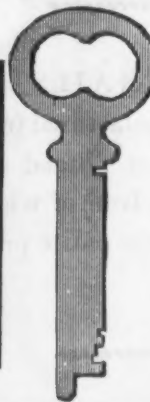
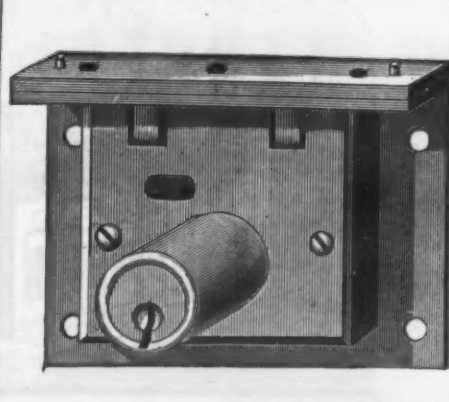
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Bore into a corner or against the wall much faster and easier than the Hatchet Brace, and does just as good work, and easier in the clear, as the ordinary Brace.

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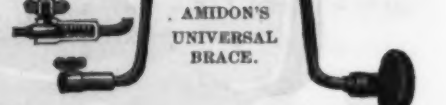
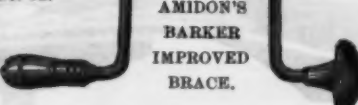
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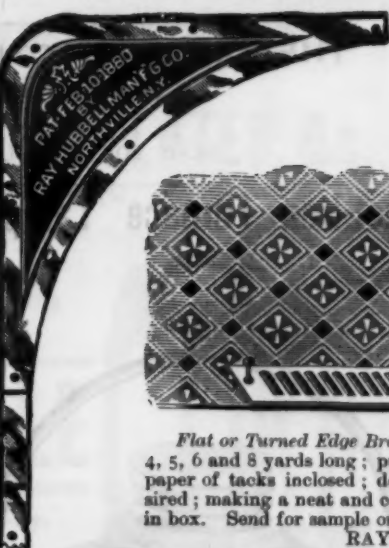


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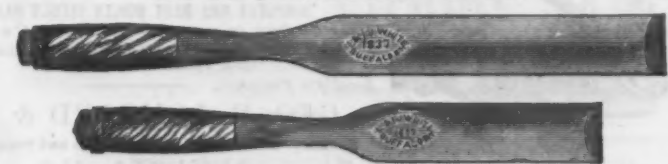
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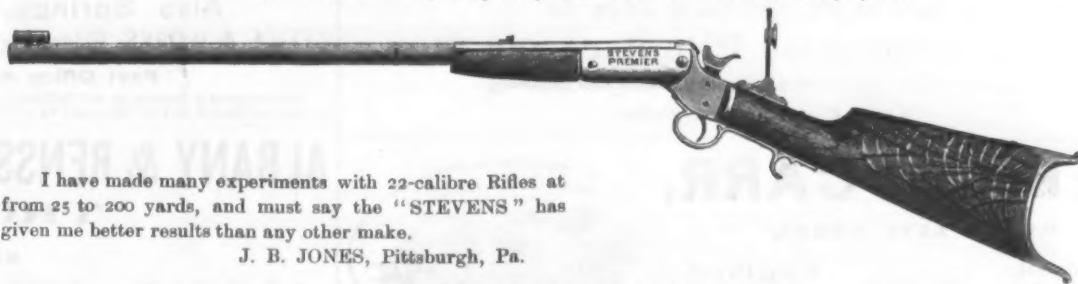
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26-inch...	21.	22.	24.	25.	27.	29.	31.	33.
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BLUNT CALK.

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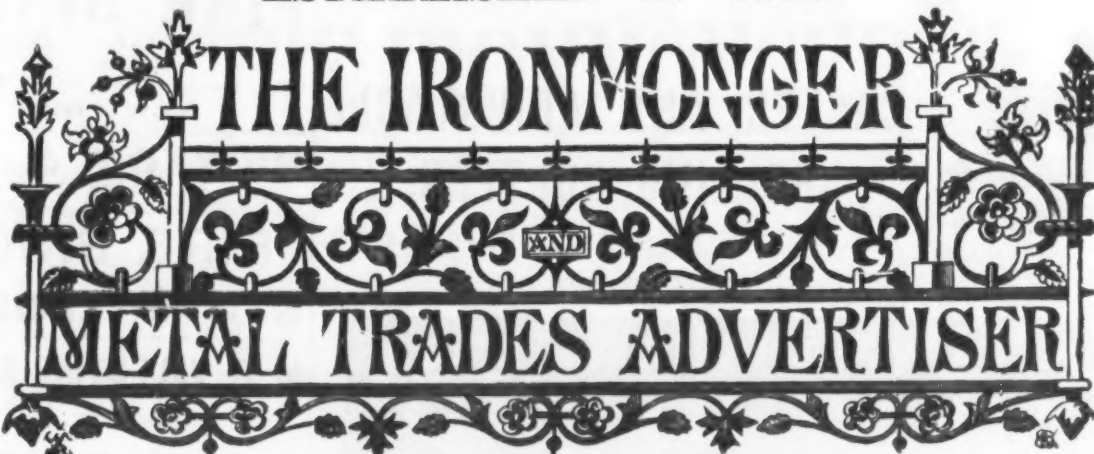
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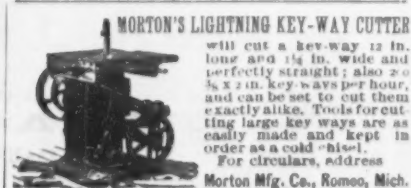
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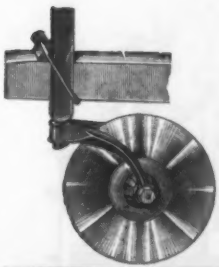




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SOLD BY ALL HARDWARE DEALERS  
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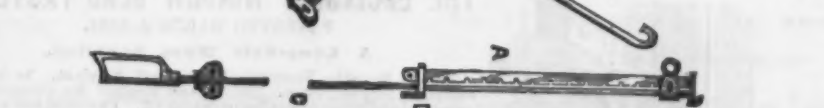
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New Haven Copper Company, 40¢ doz.  
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Snell's Ship Augers, 15¢ doz.  
Cook's Auger Bits, 50¢ doz.  
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Stearns' Pat. Hol. Augers, list 48¢ doz., 40¢ doz.  
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Light and Common, 40¢ doz.

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Upright, without Augers, list \$5.50 @ 5.50¢  
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Braces, Barker's, 50¢ doz.  
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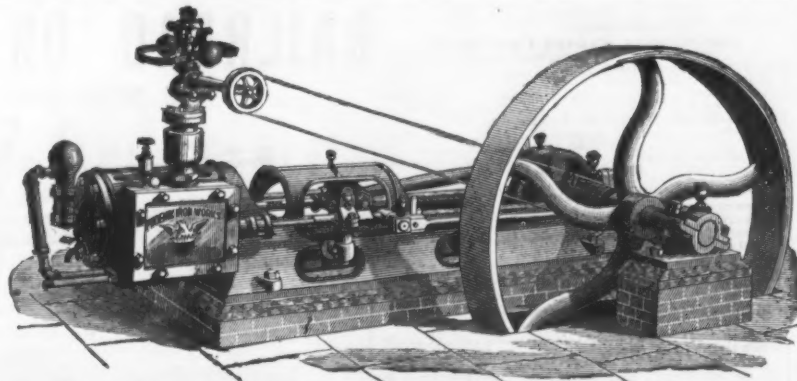
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14 to 22 by 1/2 to 1 inch, 2.5¢  
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14 to 34 by 1/2 to 1 inch, 2.5¢  
14 to 36 by 1/2 to 1 inch, 2.5¢  
14 to 38 by 1/2 to 1 inch, 2.5¢  
14 to 40 by 1/2 to 1 inch, 2.5¢  
14 to 42 by 1/2 to 1 inch, 2.5¢  
14 to 44 by 1/2 to 1 inch, 2.5¢  
14 to 46 by 1/2 to 1 inch, 2.5¢  
14 to 48 by 1/2 to 1 inch, 2.5¢  
14 to 50 by 1/2 to 1 inch, 2.5¢  
14 to 52 by 1/2 to 1 inch, 2.5¢  
14 to 54 by 1/2 to 1 inch, 2.5¢  
14 to 56 by 1/2 to 1 inch, 2.5¢  
14 to 58 by 1/2 to 1 inch, 2.5¢  
14 to 60 by 1/2 to 1 inch, 2.5¢  
14 to 62 by 1/2 to 1 inch, 2.5¢  
14 to 64 by 1/2 to 1 inch, 2.5¢  
14 to 66 by 1/2 to 1 inch, 2.5¢  
14 to 68 by 1/2 to 1 inch, 2.5¢  
14 to 70 by 1/2 to 1 inch, 2.5¢  
14 to 72 by 1/2 to 1 inch, 2.5¢  
14 to 74 by 1/2 to 1 inch, 2.5¢  
14 to 76 by 1/2 to 1 inch, 2.5¢  
14 to 78 by 1/2 to 1 inch, 2.5¢  
14 to 80 by 1/2 to 1 inch, 2.5¢  
14 to 82 by 1/2 to 1 inch, 2.5¢  
14 to 84 by 1/2 to 1 inch, 2.5¢  
14 to 86 by 1/2 to 1 inch, 2.5¢  
14 to 88 by 1/2 to 1 inch, 2.5¢  
14 to 90 by 1/2 to 1 inch, 2.5¢  
14 to 92 by 1/2 to 1 inch, 2.5¢  
14 to 94 by 1/2 to 1 inch, 2.5¢  
14 to 96 by 1/2 to 1 inch, 2.5¢  
14 to 98 by 1/2 to 1 inch, 2.5¢  
14 to 100 by 1/2 to 1 inch, 2.5¢  
14 to 102 by 1/2 to 1 inch, 2.5¢  
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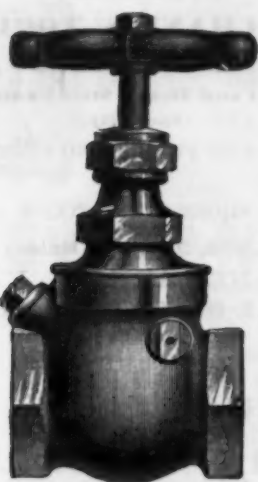
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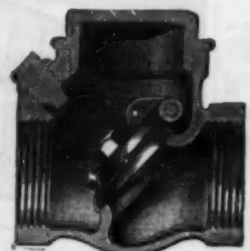
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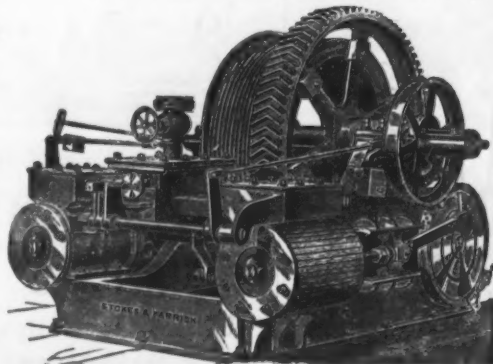


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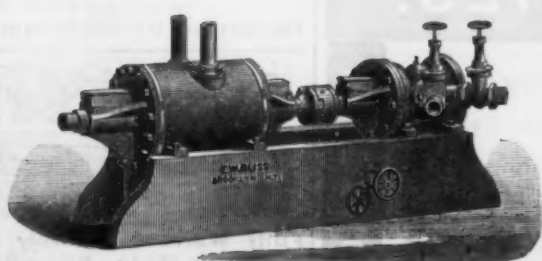
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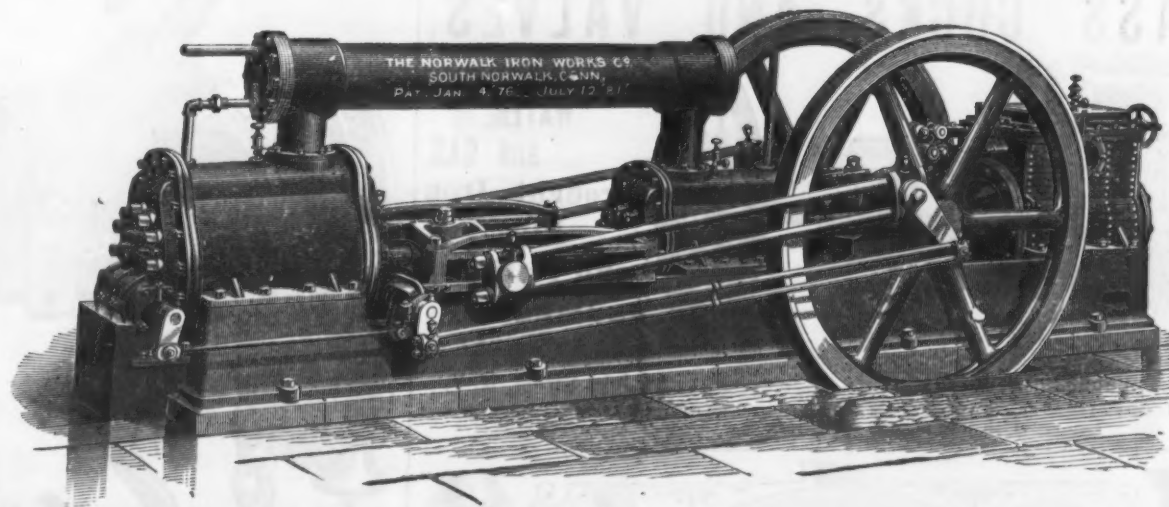
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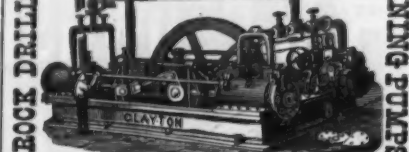
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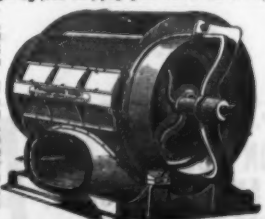
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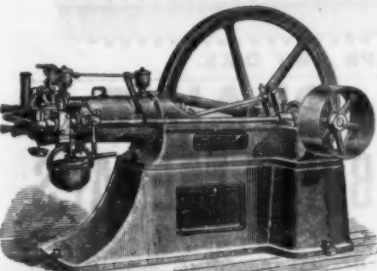
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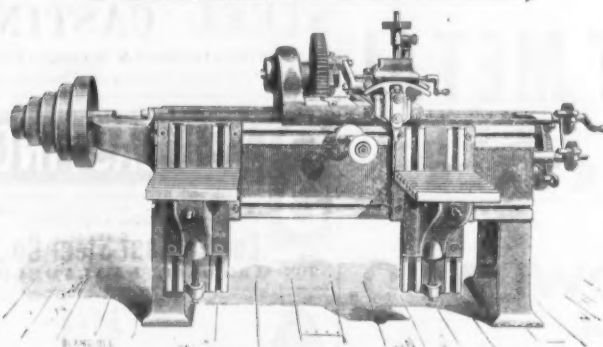
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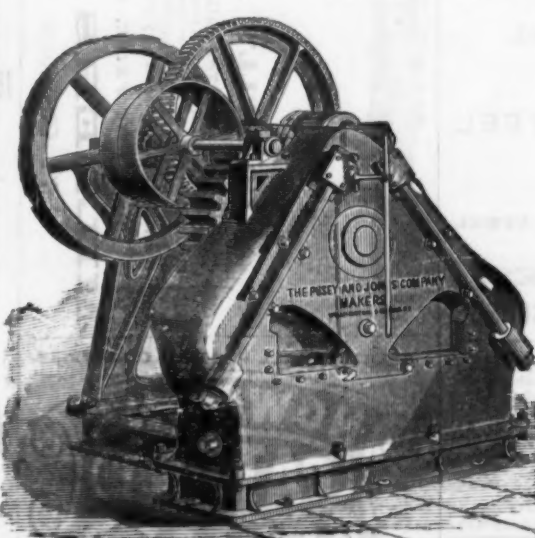
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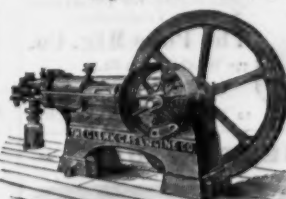
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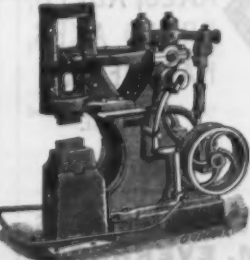


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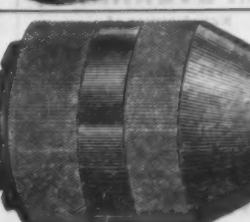
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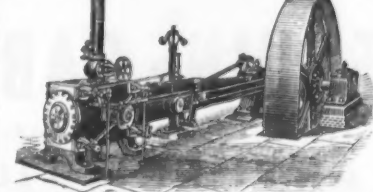
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